

FINANCE

COMMERCE

ENGINEERING

YALE UNIVERSITY
APR 8 1941
LIBRARY

THE FAR EASTERN

REVIEW

FOUNDED BY GEORGE BRONSON REA
37TH YEAR OF PUBLICATION

In This Issue

TEA LEAVES FROM
LO PAT'S GARDEN



上海黃浦灘
念四號

遠東
時報

CHILDREN OF THE SUN
—
MEANING OF U.S. AID TO CHINA
—
INDUSTRIAL DEVELOPMENT IN CHINA'S
INTERIOR

Vol. XXXVII

FEBRUARY, 1941

No. 2



SOUTH MANCHURIA RAILWAY

Head Office : DAIREN

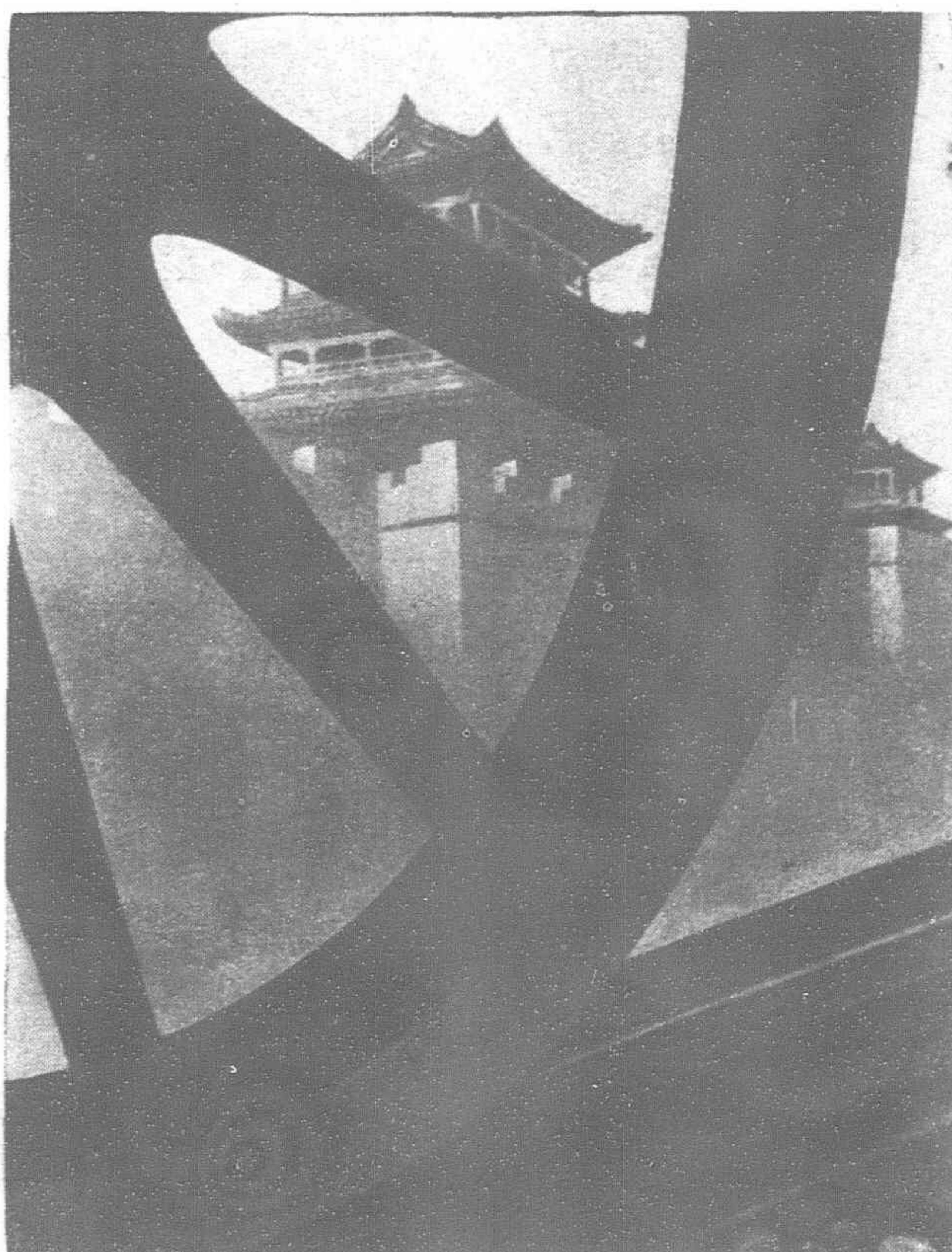
Cable Address : " MANTETSU "

*Codes : ABC 5th Ed., Al,
Lieber's & Bentley's*

IMPORTANT OVERLAND LINK BETWEEN EUROPE AND THE FAR EAST

From BERLIN to DAIREN in only 10 DAYS

The fastest and most comfortable trains in the Far East carry you to the much-talked-of Cross-Road of East Asia "Manchoukuo."



YAMATO HOTELS

at Dairen, Hoshigaura (Star Beach), Ryojun (Port Arthur), Mukden, and Hsinking are directly managed by the South Manchuria Railway Co.

TICKET AGENTS

Tickets are issued by, and Pictorial Guide Books and Information may be obtained, at the following offices:

Messrs. The Japan Tourist Bureau; Thos. Cook and Son; The American Express Company; The International Sleeping Car Company ("Wagonlits"); The Nordisk Resebureau.

S.M.R. Branch Offices { Tokyo, Osaka, Shimonoseki, Shanghai, Peiping, Mukden, Hsinking, Kirin, Harbin, Paris, New York, etc.

The Far Eastern Review

ENGINEERING

FINANCE

COMMERCE

VOL. XXXVII

SHANGHAI, FEBRUARY, 1941

No. 2

FAR EASTERN CROSS-CURRENTS

At a press conference on February 11, President Roosevelt answered a question which had been in many minds for many months, when he stated very deliberately that if the United States were forced into war in the Far East it would have no effect on the deliveries of war materials to Great Britain.

The President then firmly discouraged supplementary questions on speculations, but it seemed very obvious that the answer to such supplementary questions was that the Navy in the Pacific was perfectly capable of taking care of itself and fighting a naval war in the Pacific, while American industry continues to grind out material for Britain.

Diplomatic observers considered President Roosevelt's comment regarding possibilities of United States' involvement in war in the Far East as one of the most important observations by the President in many weeks.

Observers attached significance to the remark for the following reasons:

First, that American factories and shipping, could, in case of war in the Far East, continue to concentrate virtually all energies to production and shipment of materials to England.

Second, in view of the foregoing, it was assumed the U.S. would rely chiefly on the Navy to conduct a Far Eastern war, because otherwise vast quantities of materials would be needed to supply armies in Far Eastern operations and a vast merchant marine would be needed to transport them.

Third, if the Navy would be the chief weapon in such a war then it would be a war mainly of blockade, accentuated by the most stringent economic and financial controls which the U.S. could apply to that end.

Fourth, observers assumed that President Roosevelt does not expect the United States to take the initiative in making war in the Far East but would act only if Japan pressed too strongly upon U.S. interests in that region.

Many correspondents obtained the impression that the question was prepared in advance, with the President's knowledge, in order to enable him to make public an assertion on the subject. This assumption arose partly from the manner in which he responded, partly from the fact that it was a hypothetical question against which he has a severe rule at press

conferences, and finally, because the question was asked by a reporter for a newspaper owned by Col. Frank Knox, Secretary of the Navy.

The general impression was that President Roosevelt wanted this knowledge of his policy published in order to reach the ears of Japanese leaders who may be deciding whether to attempt to attack Singapore or the Netherlands East Indies simultaneously with a German attack on England.

Warning From Singapore

Sir Shenton Thomas, Governor of the Straits Settlements and High Commissioner of the Federated Malay States, on February 11, warned that Malaya soon may be fighting a battle which may "decide our fate."

Speaking to the Federal Council of Kuala Lumpur, Sir Shenton said that it might well be that before the next meeting of the council the battle would have begun.

If the battle started, he said, it would decide "our fate and our lives in this country."

"I don't know how far we will be involved," Sir Shenton said. "I pray we may not. If we are, our only duty will be to stand shoulder to shoulder and face the future calmly."

"In that way we will form ranks with all those in Britain, Malta and in the deserts of Libya who are facing trials and tribulations, often against overwhelming odds, with their faces set resolutely toward victory."

Foresees Crisis

German insistence on active co-operation with Japan, its Oriental ally, will cause a crisis in the Far East within 90 days, Major Evans F. Carlson, former Fourth Marine intelligence officer in China, said at Los Angeles on January 30.

Major Carlson, who also is author of several books on China and who recently returned from a trip to the Far East, including Chungking, said Japan probably would strike at Thailand and the Netherlands East Indies while Germany attempted to invade Great Britain.

He believed Japan may be forced to invade the Philippines in order to protect her flank. The Japanese were re-organizing their air force along German lines in preparation for the offensive, he said.

"German experts are helping Japan to build planes and German aviators are training Japanese fliers in the blitzkrieg technique," said Major Carlson.

Philippine Evacuation

Approximately 400 wives and dependents of the U.S. Army officers in the Philippines sailed recently for the United States aboard the Army transports *Etolin* and *Grant* within a week as a result of Washington's evacuation "invitation," the U.S. army announced to-day.

Simultaneously, the Philippines Army announced that reserve officers will be called up for 14 days intensive training beginning on February 17. Enlisted members of the reserve will be called for ten days training.

The order affects approximately 125,000 reservists. The last reservist training was held April 5, 1939.

The United States Army's plan to train 5,000 specially picked Philippine Reservists as well as increasing closer U.S. Army supervision over the Philippine Army's training have necessitated an increase in U.S. officers here. The Army Air Corps here also is expanding rapidly.

The 5,000 picked Filipino reservists will be enrolled for one year's training in the U.S. Army's native branch—the Philippine Scouts.

Issues Second Call

The advice to all American women, children and men who are not bound by business interests in the Far East, to leave China was repeated by the American Consulate-General on February 13, in a circular addressed to all American residents in Shanghai.

The consular notice follows:

"The American Consulate-General at Shanghai refers to its previous circulars addressed to Americans resident in this consular district communicating the advice of the Department of State to withdraw to the United States, and now desires to state that the Department has renewed its advice which is intended to apply particularly to women and children and to those men whose continued presence is not regarded as urgently or essentially required. This advice is a further precautionary measure and is being given in the interest and convenience of American nationals and in the interest of national security."

"The Department of State does not contemplate sending a special vessel or special vessels to assist in the withdrawal. It is expected that American nationals will take advantage of such transportation facilities as may be currently available.

It may be recalled that the first advice was given to American nationals last October and that subsequently approximately 1,500 U.S. citizens left the Far East in the three specially-chartered steamers, the *Mariposa*, *Monterey* and *Washington*, in addition to separate groups who sailed to the United States on Japanese steamers.

Australia Uneasy

"There is no doubt of the seriousness of the international situation as it affects Australia," declared the Acting Prime Minister, Mr. A. W. Fadden, and the leader of the Labor Party, Mr. John Curtin, in a joint statement after a meeting of the War Council.

The Council discussed developments in the Far East and called into conference Vice-Admiral Sir Ragnar Musgrave Colvin, who was sent by the British Admiralty to the Australian Government as the First Naval Member of the Australian Naval Board, and Air Chief Marshal Sir Charles Stuart Burnett, Chief of the Australian Air Staff.

The statement also declared: "The War Council realizes the necessity for taking all possible steps and calls on each individual for the maximum effort."

Hull Attacks Japan

Mr. Cordell Hull, Secretary of State, did much to secure passage of the Lease and Lend Bill through Congress when he appeared before the House Foreign Affairs Committee and delivered the most severe indictment of aggressor nations he has yet made anywhere.

Much of his attack was directed against Japan; he put the actions of that nation into the perspective from which both the Administration and State Department view those actions.

It is agreed that seldom has such an indictment of one country been delivered by the Foreign Minister of another while the nations concerned are at peace, and Mr. Hull's statement is regarded as a warning to Japan that America is not prepared to stand by and see the subjugation of half the world's population.

It is also regarded as notice to Japan that her threats to the United States have been noted and for the sake of American safety and security taken at face value, and that this country is preparing for all eventualities which the actions of Japan or any other aggressor may create.

After stating the peaceful intentions of American policy, he referred to the three nations which had made it abundantly clear by word and deed that they were determined to repudiate and destroy the very foundation of civilized world order under law, and to enter upon a road of armed conquest and subjugation of other nations and of tyrannical rule over their victims.

Mr. Hull then bluntly declared that the first step in this fatal direction had occurred in the Far East when Japan forcibly occupied Manchuria in contravention of the Nine-Power Treaty and the Kellogg Pact, after which the equilibrium of the Far East which had been established by the Washington Conference became seriously disturbed.

Japanese control was marked by the carrying out of a policy of discrimination which forced out American and other foreign interests, he said.

During the following years, Mr. Hull added, Japan went steadily on in preparation for expansion by force of arms, intensifying construction of military and naval armaments and undertaking actions directed towards extension of her domination over China and involving disregard and destruction of the lawful rights and interests of other nations.

In cold tones of disapproval Mr. Hull described the large-scale invasion of China in 1937 by a million men and the occupation of the coast and interior provinces.

"It has been clear throughout that Japan has been motivated from the start by broad ambitious plans for establishing herself in a dominant position in the entire western Pacific.

"Her leaders have openly declared their determination to achieve and maintain that position by force of arms and make themselves masters of an area containing almost half of the world's population. As a consequence they have arbitrary control of sea and trade routes in that region.

"Previous experience and current developments indicate that the proposed new order means politically, domination by one country, economically employment of the resources of the area controlled to the ultimate impoverishment of other parts of that area and exclusion of the interests of other countries; socially it means destruction of personal liberties and reduction of conquered peoples to the role of inferiors.

"It should be manifest to every person that such a program for subjugation and ruthless exploitation by one country of nearly half the world's population is a matter of immense significance and importance, and the concern of every other nation wherever located."

Japan's Foreign Minister Speaks

The present state of Japanese-American relations is not "desperate" Foreign Minister Yosuke Matsuoka told the plenary session of the Lower House Budgetary Committee.

"I firmly believe that we must strive to the very end without despairing to improve the situation . . . I am dealing with Nippon-American relations in that spirit," declared Mr. Matsuoka.

Stating his belief that Admiral Kichisaburo Nomura is admittedly the best candidate for the post of Japanese Ambassador to the United States in view of his long acquaintance with President Roosevelt, Mr. Matsuoka said that "I have asked him to bring realization to President Roosevelt, Secretary of State

Cordell Hull, and other American leaders that a Japanese-American war would not merely affect the two countries but would affect the destiny of mankind."

Declaring that the fate of the world's civilization depended solely upon the attitude of the United States, Mr. Matsuoka, said that "we must have the United States reconsider its attitude." He further charged that the United States had abandoned the Monroe Doctrine and had extended its defence frontier to the western Pacific.

The Foreign Minister charged that the U.S. had not only extended its defence frontier from the eastern to the western Pacific, but had included Australia and New Zealand therein.

"It is outrageous that the United States should object to Japan's control of the western Pacific," Mr. Matsuoka said. "We must control the western Pacific.

"We must have the United States re-consider its attitude, not only for Japan's sake, but for the world's. If this is impossible then we cannot hope for an improvement in Japanese-American relations.

"The fate of the world's civilization depends solely on the attitude of the United States. I intend to make every effort toward effecting American reconsideration to the last. I want it understood that this is impossible through flattery."

Refuting Mr. Hull's charge that the Manchurian Incident had been the first step in the destruction of world peace, Mr. Matsuoka asserted that "the Incident was the first step toward the construction of world peace, through the establishment of the great East Asia co-prosperity sphere."

"The U.S. authorities can understand it (the co-prosperity sphere) but purposely do not," the Foreign Minister continued. "We cannot change our national policy to endorse the American view.

"About 20 years ago there were only a score or so of people in America who said that China was the first line of defence for America. However, the opinion has gradually spread until it is firmly implanted among the country's influential classes.

"America's present assistance to Chungking is the outcome of this calculating mind. Truly speaking, genuine co-operation between Japan and China would not annoy the United States. However, the United States' fundamental policy is to restrain Japan through China, wherefore, even if Japan respected American rights in China, or withdrew her soldiers from China, it is impossible to change this American policy.

"Japan's course is to face this situation with strong determination," said Mr. Matsuoka. He asserted that the Anglo-Saxon nations were eager to maintain the *status quo* in East Asia.

"However," he went on, "if the maintenance of the *status quo* were favorable for Japan, they would not hesitate to help its modification. When the Chinese tried to destroy Japan's vested

interests in Manchuria and Mongolia, which Japan had established at the risk of her people's existence, the Anglo-Saxons gladly encouraged the Chinese.

"This made the Chinese prouder and prouder until matters culminated in the Lukowchiao Incident (the outbreak of Sino-Japanese hostilities)."

Replying to further interpellations, Mr. Matsuoka denied that Japan entertains misgivings with regard to the Tripartite Alliance between Japan, Germany and Italy.

A contingency as specified in Article 3 of the Axis-Japan pact might come about should the situation in the Pacific take a turn for the worse in view of the passing of the Lease-and-Lend Bill by the Congress of the United States, American development of naval and air bases in the Pacific and Anglo-American co-operation there, declared Mr. Matsuoka.

Article Three of the tri-power pact provides that Japan, Germany and Italy should undertake to assist one another with all their political, economic and military means when one of the three contracting parties is attacked by a power at present not involved in the European war or in the Sino-Japanese conflict.

Mr. Matsuoka stated this in reply to a question during a Budget sub-Committee meeting in the House of Representatives regarding the significance of Article Three of the Axis-Japan pact *vis-à-vis* the current international situation in the Pacific area. The questioner pointed out that Asia is included in the area to be covered by the Lease-and-Lend Bill now before the United States Congress and that Japan's life-line was being menaced by Anglo-American co-operation in the Pacific area as well as by the strengthening of American naval and air bases there.

Mr. Matsuoka said that the contingency as specified by Article Three might occur in case the situation in the Pacific, as mentioned by the interpellator, takes a further threatening turn.

Referring to China and the South Seas, the Foreign Minister said that Anglo-American movements in China and the South Seas were very important to Japan and therefore the Government was constantly watching the situation both from the diplomatic and military viewpoint.

Peaceful Methods

Any attempt to achieve her aims through armed force would bring about destruction "with unfavorable effects upon Japan," said Mr. Chuichi Ohasi, Vice-Minister of Foreign Affairs, addressing the Audit Committee of the Lower House on February 17.

Japan's policy is to seek the solution of the "life and death problem" of her interests in the South Seas through peaceful negotiation to the very last, Mr. Ohasi said, replying to an interpellation by Mr. Shigeru Ishizaka, former Independent member.

Japan's interest in the Philippine archipelago was one which could be reasonably displayed toward "a member of our neighborhood," he said, adding: "We hope that they will not become a

threat to Japan, and we are anxious to see that they do not."

Confirming that the conversations in Batavia between Japan and the Netherlands East Indies had become deadlocked through mutual "misunderstandings" following an exchange of agenda, Mr. Ohasi stated that the negotiations are expected to be reopened, as the result of an understanding reached between Gen. J. C. Pabst, Netherlands Minister to Japan, and himself.

The interested Powers "show a marked tendency to display an unnecessarily great fear of Japan" in his opinion, the Vice-Minister said, and he attributed this to the circulation in Great Britain of a "false report that Japan was about to begin moving southward immediately."

It was regrettable that such a report created further discussion in the Netherlands East Indies, the Vice-Minister said, voicing the belief that the recent conference in Washington between Mr. Cordell Hull, American Secretary of State, and the British, Australian and Netherlands' envoys may have been precipitated by such a development.

However, should any attempt be made to bind Japan by the circulation of such false reports, Mr. Ohasi told the Committee, Japan must of necessity resist such a scheme. "Grave consequences will then be unavoidable," he warned. It was imperative under the present "extremely delicate international situation" not only to secure an understanding abroad, but to seek to prevent, not only at home but abroad as well, any "unforeseen developments."

"Although our interests to the south constitutes a matter of life and death, use of armed force will entail destruction which will have unfavorable effects also upon Japan. The Government's policy is to seek their solution by means of peaceful negotiations," Mr. Ohasi said.

War Fear Unwarranted

The Cabinet Information Board on February 15 announced that the tense situation between Japan and the United States did not warrant the assumption that the two nations would go to war. The formal statement was directed to Japanese residing in North and South America. It said:

"Information has reached Tokyo stating that unrest prevails among Japanese colonies on the American continents because of a sensational report circulated in both North and South America that the situation between Japan and the United States is marked with extreme tension.

"It is true the situation between Japan and the United States has given cause for some concern but it is unwarrantable to jump to the hasty conclusion that the situation between the two countries will be overtaken by such a worse eventuality as war.

"Needless to say, both the Japanese and American Governments are doing everything within their power to prevent the situation from coming to such a pass.

"The vigorous propaganda now going on abroad and representing the situation between Japan and the United States as extremely aggravated must be ascribed by impartial observers to ulterior motives of some foreign elements.

"The Imperial Government advises all Japanese residents of North and South America not to be disturbed by irresponsible and sensational reports but, instead, to steady themselves so as to pursue business as usual."

Americans Quit Hongkong

Two thousand Americans, whose continued presence in Hongkong is not essential, have been advised by the United States Consul-General to leave.

A Consulate circular states that the Department of State is making no assumption that a situation of "acute physical danger to American nationals is imminent," and the advice is not meant to be alarmist, being made mainly because of the continued existence in the Far East of political uncertainties.

Regret at the departure of so many Americans from the Far East was expressed at the Japanese press conference on February 14. When asked if the recent alarm over the situation in the Pacific was justified the reply was: Japan will never take an attitude which will stir the waves of the Pacific but if strong pressure is exerted on Japan, she may be compelled to take certain measures. Until the last moment, the spokesman continued, Japan will bend every effort to preserve peace in the Pacific. It was added this was not only the view of the spokesmen but of the Japanese public in general. The Navy spokesman indicated that there was no cause for great alarm.

Asked to comment on the recent Dutch order that Netherlands ships in Pacific waters should go to neutral ports, the navy spokesman said that he had not been notified officially of the order. In answer to another question, he said that Japanese lines with ships going to America, had not altered their sailing schedules.

Fleet Off Indo-China

Large Japanese naval units, including an aircraft carrier, continued to cruise in southern waters off Indo-China and Thailand, authoritative quarters at Saigon report.

The Japanese fleet was reported south of Cape St. Jacques, at the entrance to Camrahn Bay.

Although it was officially denied that the Japanese Battle Fleet was off Haiphong, it was learned that several Japanese naval units were cruising in waters south of Hainan.

Sources connected with the Japanese said that more Japanese troops would arrive at Haiphong.

A foreign official told the United Press that he had received authoritative reports from Bangkok that Japanese war materials continued to pour into Thailand even after the signing of the armistice.

He said, however, that he did not know whether the war materials constituted last deliveries of the old Thai

contract for Japanese supplies or whether the Japanese were storing the materials in Thailand for possible future use against Singapore.

Parleys at Washington

The Netherlands East Indies will "fight aggression," Mr. Cordell Hull, Secretary of State, told newspapermen on February 15 following a conference with Dr. A. Loudon, Dutch Minister to Washington.

Lord Halifax, British Ambassador to the United States, after a conference with Mr. Hull and Mr. Richard Casey, Australian Minister to Washington, said British forces in the Orient were being increased steadily.

These developments characterized a day of conferences in which State Department officials surveyed the Far Eastern situation and instructed American Consulates to authorize American vessels to take extra passengers, if necessary, in evacuating nationals from the Orient.

Lord Halifax said the British in many parts of the Orient "have been increasing their general forces quite substantially."

Lord Halifax, questioned whether he felt the Far Eastern situation had deteriorated recently replied: "I would not say that. It is a part of the world in which we all are interested."

He said it was a fair assumption that Britain was interested in keeping Pacific matters "from going to pieces," and added, "we have been working at that all along."

The three way talk between Mr. Hull, Lord Halifax and Mr. Casey, was regarded as extremely significant by observers here.

Previously to that conference, Lord Halifax, visited Mr. Sumner Welles, Under-Secretary of State.

To Fortify Guam

Amid threats of American declaration of war against Japan, the House of Representatives on February 19 overwhelmingly passed and sent to the Senate the U.S. \$245,228,500 bill for the construction of aerial and naval bases from Newfoundland to Trinidad and on Guam and Samoa islands in the Pacific.

The House ignored Japanese objections to the construction of aerial and naval bases on Guam, 1,500 miles south of Yokohama, following the most belligerent statements addressed to Japan by American legislators in many years.

Passage of the bill was the first step in carrying out President Roosevelt's U.S. \$898,000,000 supplemental naval expansion program which was requested by the White House last week.

Opening the debate on Guam and Samoa naval base improvements, Mr. Carl Vinson, Georgia Democrat and chairman of the House Naval Affairs Committee, read a letter from Admiral Harold R. Stark, Chief of Naval Operations, advising Congress to ignore any Japanese objections to expansion to distant Pacific bases.

"The proposed improvements for Guam are inoffensive," the letter said.

"If Japan did profess offence, it would be unmerited and should, in my opinion, be totally disregarded."

"After all," the Admiral's letter stated, "Guam is United States property and it seems to me our actions should be determined by what is best for the United States, and not dictated by any foreign Powers."

Mr. Vinson read a similar letter from Col. Frank Knox, Secretary of the Navy, stating that Guam improvements were of "particular importance to the Navy."

Discusses Strategy

Declaring that the entry of the United States into the war would be a masterly strategic achievement of the Axis Powers, Rear-Admiral Gumppei Sekine (Retired), former Chief of the now defunct Publicity Bureau of the Navy Office and naval commentator, stated that the United States is in no position to wage a two-front war.

"Japan has no intention whatsoever of forcing war upon the United States, but it would be a masterly strategic achievement on the part of the Axis Powers should the United States unleash war in the Pacific of her own accord," the Admiral declared writing in the *Hochi Shimbun*, Rightist newspaper.

The United States cannot at present extend full aid to Britain and wage war on Japan at the same time, the Japanese commentator said, because, firstly, American industrial power is insufficient, secondly, her naval strength is insufficient, and thirdly, on account of a possible protraction of a war with Japan should it be started now.

American naval strength, Admiral Sekine declared, consisted at present of only 15 battleships, six aircraft carriers, 18 heavy cruisers, 17 light cruisers, 80 destroyers and 34 submarines.

It would be impossible for the United States to wage war on Japan with such naval strength, which is not much different from Japan's, the article continued.

A war in the Pacific at this juncture would be a protracted affair, as predicted by Admiral Yates Stirling, noted American naval authority, Admiral Sekine said, because the United States' fleet would remain off the western coast of America or would try to enter Singapore by way of Hawaii or Australian waters.

In addition, an outbreak of hostilities in the Pacific would compel the United States to suspend aid to Great Britain, with the result that the latter country would certainly collapse before the German onslaught, while Germany and Italy, not only under the provisions of the tripartite pact but actuated by the necessity of establishing a hold on Latin America, would start an attack on the United States.

Thus, said Admiral Sekine's article, the United States would not be likely to start a war in the Pacific.

Urges Action

Japan should lose no time in taking appropriate measures against the growing activities of the United States in the

Pacific as these activities are clearly aimed against Japan, Admiral Ryuzo Nakamura, retired, declared in an article appearing in the *Yomiuri*.

Said the Admiral, "The intimidating attitude taken by Commodore Perry has not yet been discarded by the U.S. despite the fact that Washington is alleged to be opposed to any use of force. The national defence bills presented to the current session of Congress eloquently reveal the American idea of self-defence. Backed by its wealth and military power, with protection of liberalism as its slogan, America is trying to intimidate other powers into surrender."

"America is virtually at war now. The Axis, on the other hand, has not declared war against the U.S. only because its naval force is insufficient to inflict a crushing blow on America."

"The U.S. has constantly helped Chiang Kai-shek, it has claimed economic embargoes against Japan. It is only due to her patience that Japan has not yet declared war against the U.S. But recent American moves regarding the Dutch East Indies, French Indo-China and other parts in the Far East have aggravated the situation further."

"Such a state of antagonism, only a step short of war, is easily broken, for both parties are constantly working out measures against each other."

"Japan should not lose time and should take immediately appropriate steps to counteract American moves in the Pacific," the Admiral concluded.

Foreshadows Strife

Great Britain and the United States are blamed for the threatening war clouds in the Pacific in an article in the *Asahi* by Gen. Akira Muto, of the Military Affairs Bureau of the War Ministry, in which he urges the Japanese nation to pull together for the creation of a new order in East Asia.

The whole world, he says, is now thrown into a seething cauldron of super-emergency, "resulting in the rivalry of the new and old order camps into which the world Powers have now been divided." Whether you like it or not, he adds, the tendencies are speeding headlong towards world catastrophe.

Gen. Muto's article reads in part:

"Not being in sympathy with the movement of Japan for the liberation of all the Asiatic races and desiring to vindicate their interests through the maintenance of the *status quo*, Britain and the United States are trying to put a spoke into the wheel of Japan's advance, are attempting to prolong the Sino-Japanese show-down by rendering assistance to the Chiang régime, and, withal, are denying the construction of the new East Asia order and the East Asia Solidarity Sphere contemplated by Japan."

"It is this attitude on their part that is gathering dark cloud on the Pacific horizon. The new East Asia order and the Pacific problems are one and the same. After all, the completion of the new East Asia order and the East Asia Solidarity Sphere cannot be hoped

for without the solution of the Pacific problem.

"However, should the United States stand for justice and adopt a calm attitude, the Pacific Ocean will remain pacific as its name implies, for Japan's new order in East Asia is not in the least motivated by aggressive designs but by the desire to liberate and succour all the oppressed Asiatic races to enable each of them to have its proper place.

"In spite of this, the United States does not even try to interpret the true concept of the new order, which is based upon high morality, but, instead, is throwing obstacles in the way of Japan, out of selfish ends and sentimentalism, by placing export embargoes on important materials to Japan.

"Not content with this, the United States is extending new loans to the moribund Chiang régime in collaboration with Britain, and at the same time is trying to form a strategical line against Japan on the Pacific Ocean, linking America, Canada with New Zealand and Australia. All these unfriendly actions are entirely incomprehensible to us.

"Present conditions being such, the Pacific Ocean cannot remain pacific, nor can the construction of the new East Asia order stay outside the possible storm. Now that Japan has promised all Asiatic races the construction of the new order, there is no other choice but to complete this great task."

Japan's Navy Prepared

The Japanese Navy is always prepared to meet any eventuality. Admiral Koshiro Oikawa, Navy Minister, declared in reply to Mr. Yoshimichi Kuboi's interpellations during the plenary session of the Lower House's Budgetary Committee.

"Although I am unable to reveal details, I can definitely say that the Japanese Navy has been, and is being expanded, in view of the United States naval expansion program, Admiral Oikawa declared, adding that "in preparing for defence, the number of ships alone is not the decisive factor. The quality of the ships is another important factor. I can say with emphasis that the Japanese navy has the quality to meet any navy in the world."

Counsels American Initiative

The United States is urged to take the initiative in ameliorating the present grave position of American-Japanese relations by Mr. Kiyoshi Kiyosawa, noted Japanese commentator, in an article in the *Chugai Chogyo*. So far as general impressions go, he states, relations between the United States and Japan have now reached the limit, and will undergo a qualitative change for the worst the moment the line is overstepped by either side.

"This is not an alarmist's view," Mr. Kiyosawa continues, "but an opinion of one who for the last 30 years has studied American-Japanese relations and their development and who is in consequence, persuaded that friendly co-operation between the two Powers ought to constitute

their common policy for the sake of themselves as well of the world in general.

"There is one big complaint against America from the Japanese standpoint. And that is that America has never in a single instance paid friendly consideration to the Japanese position and interests as part of its policy. This can be concluded with every propriety since it is only too plain that even if the American Far Eastern policy were to be enforced to the letter, it would open up for Japan no real way to subsist as a nation under the existing condition of the world.

"America is always ready to talk of Japan's 'aggressive' policy, but the question is, what constructive policy for Japan America even entertained during the "Shidehara Diplomacy" era of 10 years which even Mr. Stimson eulogized so much in his work entitled the Far Eastern Crisis. Nor should it be forgotten at this moment that it was when Japan was most faithfully espoused to a co-operative policy toward America after the Washington Conference, that the latter denied Japan by means of its immigration act and its high tariff law. The Manchurian incident was forced upon Japan in its attempt to find a way to subsist in the East after being shut out of the West.

"All this, however, is useless re-creation at the present critical moment for the flames are about to break loose. Whatever the cause, the urgent thing to do is to suppress the smouldering before it flares up into a formidable fire.

Civil Strife In China

Official and other circles in the United States are watching with interest matched only by their concern the present civil strife in China, says a Reuter dispatch. It is hoped that Gen. Chiang Kai-shek with skilful handling can avert what might easily become a disaster for China and victory for the Far East Axis partner.

Many think the matter dates back to the closing of the Burma Road after which it was reported that Russian aid to China began to melt away to a mere trickle. This was accompanied by suggestions from Moscow that Gen. Chiang might profitably seek closer relations with Yen-an (headquarters of the Communist forces) and that a larger voice in the councils of the Chinese Government should be given the Chinese Communists.

Unable to look a gift horse too closely in the mouth and pessimistic about continued Democratic aid, Gen. Chiang had begun to trim his sails accordingly when the Burma Road was reopened and financial aid from America and Britain was announced. This again changed the picture and made Gen. Chiang less dependent on aid which appeared to be not entirely above suspicion.

In addition it is reported that the Chinese Communists have scarcely been living up to their agreement with Gen. Chiang not to teach Communist doctrines in areas where they are fighting, that in fact they have done as much propagandizing as fighting and have enlisted many more men than the agreement with Chungking permitted; but whatever the causes,

this civil strife is much regretted at a time when every ounce of unity in China is necessary if the power which threatens both the Kuomintang and the Communists, namely Japan, is to be successfully fought.

The *New York Herald-Tribune*, in an editorial titled "An Untimely Chinese Feud," says it is impossible to pass judgment on the situation until much more is known about it except to re-echo the lament that it is most unfortunate. The paper states that Gen. Chiang may have been grudging and parsimonious in his assistance to the Reds but points out there is much fear in the Kuomintang and among Government officials that unless something is done a final victory over Japan might also be a Communist victory over China, and China would be out of the Japanese frying pan into the Soviet fire. This recalls a Chinese slogan which recently reached Washington that Japan "is merely lice on the body of China but Communism is a disease of the heart."

It is feared that this attitude and the civil strife with the Communists may strengthen the arm of those who are known to be urging the Government to come to terms with Mr. Wang Ching-wei and the Japanese.

The *Herald-Tribune* concludes its article by saying that when the Japanese are preparing for a push into the "south seas" it is imperative in the interests of China and her friends that she immobilize as many Japanese troops as possible in China and therefore it is a great pity that a bitter domestic feud is being worked up.

Chungking Optimistic

Chinese circles are not perturbed over the Communist situation, the result of the High Command's decision for the disbandment of the Communist New Fourth Army on the south bank of the Yangtze river last month.

Following the conclusion of brief fighting between Government and Communist troops on the south bank of the Yangtze river, no major fighting is reported to be taking place between Government and Communist troops in any of the other areas.

Meanwhile, negotiations are progressing between Government and Communist authorities for an amicable settlement of their differences.

Chinese Government military quarters are confident that they have the situation well in hand.

While official quarters do not wish to make further comments on the situation since Generalissimo Chiang Kai-shek as well as the military authorities have already issued statements thereon, Reuter reports that the attitude of the Government authorities may be summarized as follows:

Chinese Government military authorities are firm in their stand that military discipline in the Chinese army must be maintained at all costs. Any units in the army, whether Communist or others, disobeying orders of the High Command, will be drastically dealt with by the Government.

The question of military discipline is entirely separated from party affairs. In other words, the Government is maintaining its usual relations with the Chinese Communist Party and other political groups and is not involving any party with the Government measures concerning the New Fourth Army.

There are high prospects of an amicable discussion of the Communist Party issue at the forthcoming meeting of the National Peoples' Council in which the Government, Communist and other party delegates are represented.

It is felt that a frank discussion and exchange of views among the delegates at the meeting will pave the way to an amicable settlement of the differences between the Government and the Communists.

Chungking circles, however, emphasize that while the Government is ready to do its utmost to bring about an amicable settlement, if the Communists endeavor to take any action threatening unity or of interfering in the government program of resistance against Japan, the Chinese Government military authorities will not hesitate to take drastic measures to deal with the situation.

Economist to Chungking

Dr. Lauchlin Currie, administrative assistant to President Roosevelt is en-route to Chungking on orders from President Roosevelt. His visit has stirred much speculation but little has been revealed, officially, of its purpose.

Because Dr. Currie is an outstanding authority on economics and because of U.S. financial assistance already extended and contemplated to China, observers believed the visit was to obtain first hand economic information.

Dr. Currie was born in Nova Scotia and came to the United States in 1925. He was naturalized in 1934. From 1927 to 1934 he was an instructor at Harvard University and later became consultant and director of research for a large cotton concern.

He joined the United States Treasury department in 1934 as a senior analyst and became director of research and statistics for the Board of Governors of the Federal Reserve System.

President Roosevelt appointed Dr. Currie his administrative assistant in 1939. Dr. Currie is a member of the American Economic Association and author of "The Supply and Control of Money in the United States."

Die In Plane Crash

Six high Japanese naval officers, including Admiral Baron Mineo Osumi, a member of the Supreme War Council, were killed when the plane in which they were travelling from Canton to Hainan island crashed a few minutes after taking off.

The accident occurred on February 5, but was only revealed in a Navy Office communique following discovery of the wreckage on Hwangyangshan mountain, on the right bank of the West river, in Kwangtung province.

The communique reads: "An aeroplane requisitioned by the Navy, with Admiral Baron Mineo Osumi, member of the Supreme War Council, Lieut. Hideo Matsuda, his aide, Rear-Admiral Hikojiro Suga, Commander Takao Tsunoda, Commander Eiichi Shirohama, and Fleet Paymaster Chugoro Tachimi aboard, hopped off from Canton at 12.15 p.m. on February 5 for Hainan island and became missing since 12.30 the same day.

"On receipt of the news, a Japanese naval unit nearby started a search for the missing plane in co-operation with a military force. The wreckage of the same plane was found on Hwangyangshan mountain, on the right bank of the West River, in the morning of February 6 as a result of aerial observation. A landing party immediately landed and started to advance on the spot covered by a naval, air and military force. The Japanese forces reached the spot on the afternoon of February 7 and immediately started to pick up the occupants of the plane.

Admiral Osumi has been inspecting the military situation in China. Born on May 1, 1879, he served aboard the warship *Matsushima* during the Russo-Japanese war. After being stationed in Germany, he was appointed aide to Count Heihachiro Togo in 1912, and later attended the Versailles Peace Conference while serving as naval attache at the Japanese Embassy in Paris.

Raised to be Vice-Admiral in 1924, he was appointed Commander-in-Chief of the Yokosuka naval base in 1929, promoted to Admiral in 1931, and served twice as Navy Minister under the late Admiral Minoru Saito in 1932 and under Admiral Keisuke Okada in 1934.

Admiral Osumi proceeded to Italy in 1939 shortly before the outbreak of the European war.

Rear-Admiral Hikojiro Suga was born on March 4, 1889, and served in the World War aboard the warship *Matsuo*. He began a long service in China waters when appointed Captain of the gunboat *Katada* in 1928, being thereafter stationed at Hankow, Nanking, Amoy, Tientsin and Shanghai.

Rear-Admiral Suga was appointed Rear-Admiral in November 1939, and was seconded to the staff of General Nobuyuki Abe, Ambassador to Nanking, last year and then assigned to duty on the staff of the Japanese China Seas Fleet in January 1941.

Rejects Protest

The Netherlands Minister to Japan, Gen. Pabst, informed Mr. Ohashi, Vice-Foreign Minister, on January 31, that the Dutch Government in London had instructed him to inform the Japanese Government that the N.E.I. decline to be included in Japan's Greater East Asia co-prosperity sphere. Mr. Ohashi is reported to have replied to this statement that any such declaration is purely an affair of the Netherlands, in which Japan is not interested, and that his country adheres to its fixed policy of economic collaboration with the East Indies. This policy, he added, is part of the program

of promoting the welfare of all the peoples of East Asia.

The Japanese press is giving prominence to a London report forecasting the declaration mentioned above, and ascribes it to Anglo-American instigation. The comment made on this is that it will be ignored by Japan, whose policy will be unaffected. The *Yomiuri* warns the Netherlands that if that country persists in such an attitude towards Japan, it may jeopardize her own position in the N.E.I.

Rejecting the representation, Mr. Ohashi is understood to have pointed out that the sphere of common prosperity as advocated by Japan concerns only economic affairs and has no political character.

The Vice-Minister of Foreign Affairs further is understood to have informed Gen. Pabst that Japan intended to continue the Batavia parleys with the Netherlands East Indies.

Sees Singapore Threat

The *Popolo di Roma*, editorially commenting on the French Indo-China-Thailand armistice, said Japanese arbitration was a prelude to military intervention in the Singapore zone.

The Fascist organ said the mediation was completely in line with Japan's part in the tripartite alliance and said Japan's domination of greater East Asia was now recognized.

"With this Japanese mediation comes the objective recognition of the dominant function of the Nipponese Empire through greater Asia, which is completely within the framework of the tripartite alliance," the *Popolo di Roma* stated.

"But this mediation and intervention by Japan is more than Platonic homage to the Axis theory of vital space and hemispheric influence. In reality, this precedes Japan's military intervention in the Singapore zone and probable encirclement of this naval base."

Japan plans to strengthen her position in southern Indo-China for the purpose of using it as a "springboard" for Japanese action directed against either the Netherlands East Indies or Singapore, a neutral diplomatic source at Saigon told the United Press.

This source said that although the outline of the plans was clear, he could not say whether they were to be directed principally against the British in Singapore or against the Netherlands East Indies.

Thai-French Peace Talk

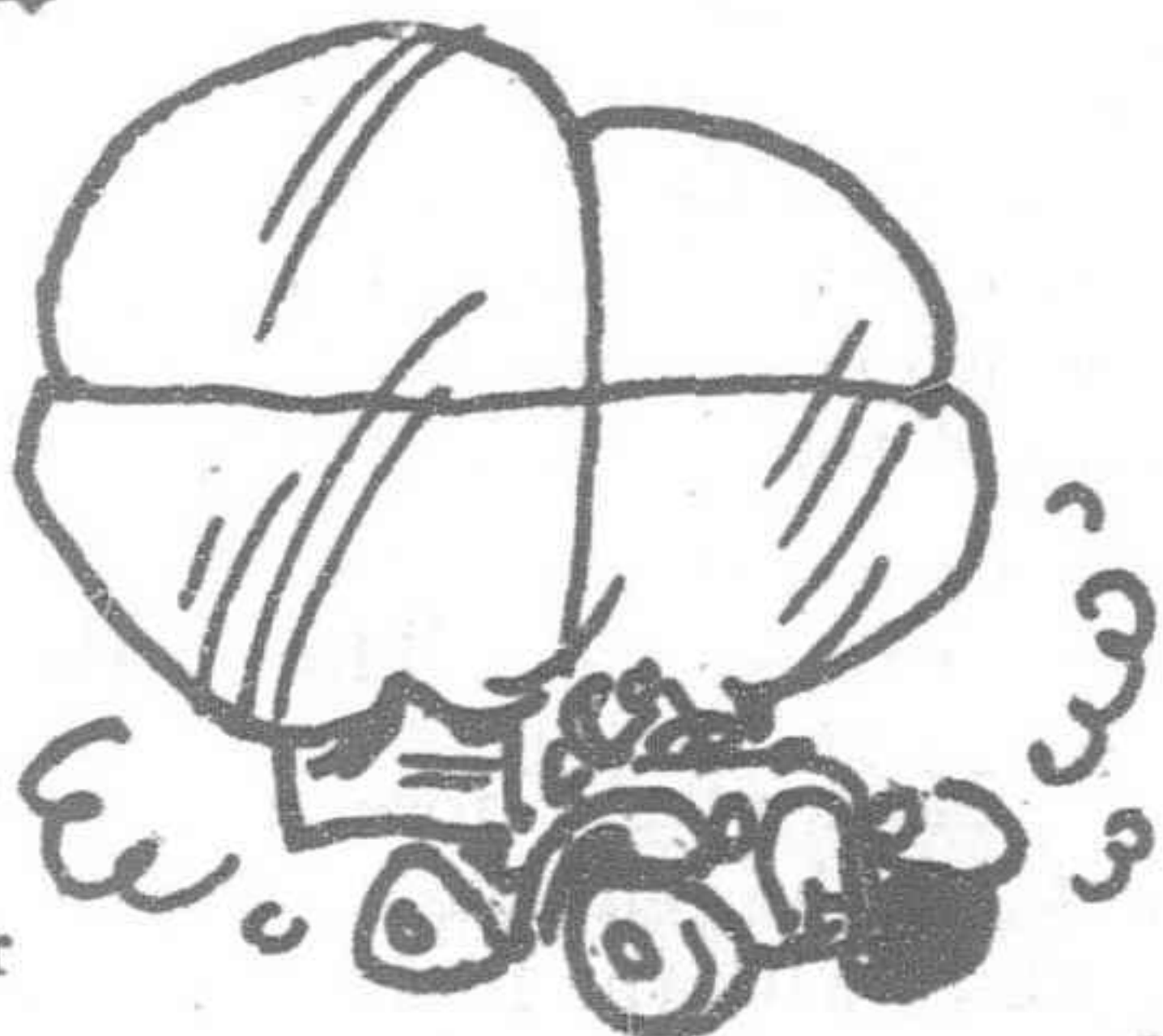
Mr. Yosuke Matsuoka, Foreign Minister, in a speech opening Thailand-French Indo-China peace negotiations at Tokyo on February 7, said the Japanese Government was "prepared to endeavor to bring about settlement of the dispute" because of his belief that "establishment of a common prosperity sphere throughout East Asia was not only Japan's policy but indeed a historical necessity in the event of world history."

Mr. Matsuoka presided at opening ceremonies, which, apart from his speech, were confined to presentation of credentials by delegates.



Those of us who frown
On sociability
Are the ones who
Need its softening effect.

Those of us
Who cannot take
The same interest
In our homes
And friends
As we do
In our business
Are like
Two cylinder cars
With
Eight cylinder
jobs.



The sex of the mind transcends
The sex of the individual.

Men with feminine minds
Baffle men
And amuse women.

The intuitive man
Lacks the divine spark
That makes woman's
Intuition practical.

Men with feminine minds
Mistake their intuition
For genius.

Men with masculine minds
Fear intuition.

Logic might be useful to a woman
Excepting when dealing with
Her husband.

BsS, MgS, or some other such proud title
Should be placed after the names of all those
Who excel as scandal mongers or, in the art
Of a very old profession which might be called
SCANDALEERING.

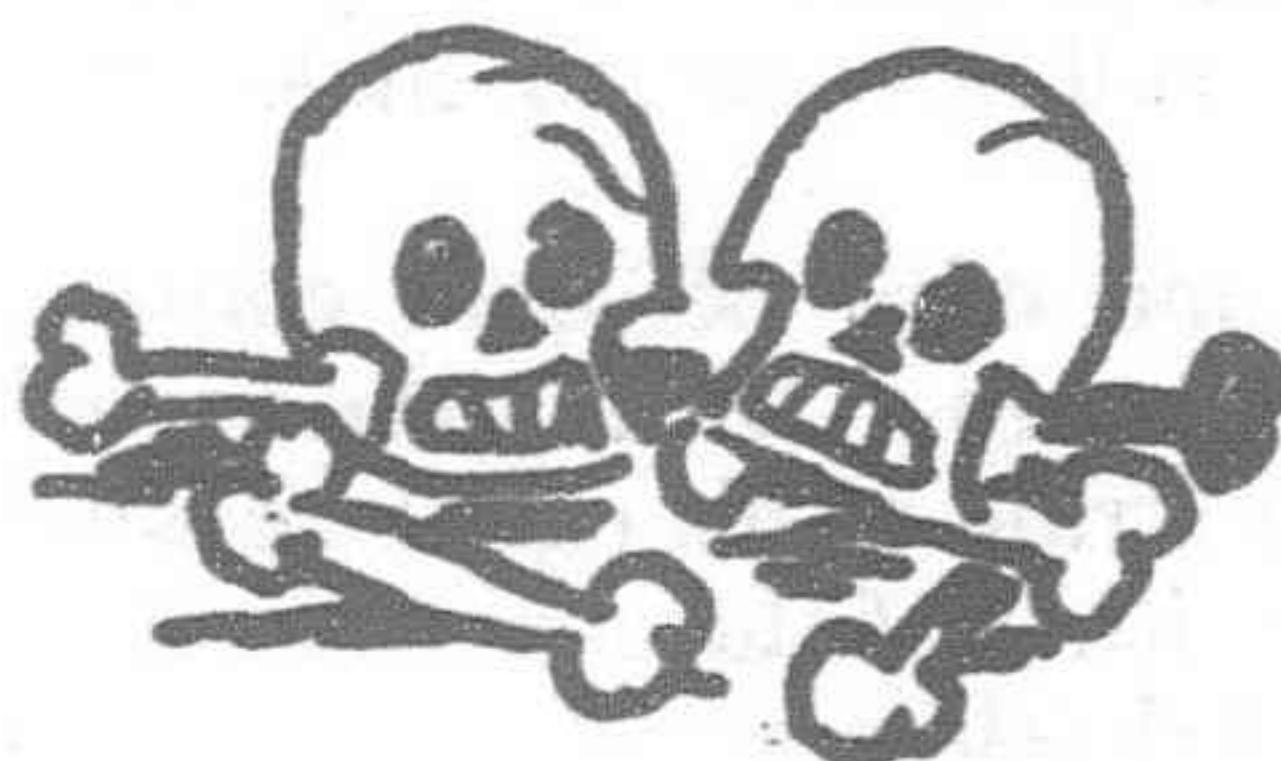
The conspiracy which keeps slander
From the ears of the injured party
Of the second part—
Prevents many a murder.

Men meet malignity by reverting to type
And striking back—or by silence.



Animosity met by silence
Dies a slow death—
When met by retaliation
It lives forever.

"Keep off the grass"
Is harsh. Alas!
I'd change this sign with pleasure—
In Nature's manse
Give grass a chance
To spread its soft green treasure.



Be careful and you will be lone-
some—
It costs just as much to bury a man
Who has been cautious all his
life,
As it does the one who will
take a chance—
Now and then—at least!

O, live a life of caution
Or, live a life of fear
And others take the pleasures
That we should have while here!

The humorist will make us laugh
When swallowing his sweet pills
Of bitter truth.

It may be easier
To reach a man's heart
Through his stomach
Than through his head—
But it is only possible
to reach the heads
Of some
By tickling their
sides.



Those good people who hold
That God made the world
And then filled it with sinners
Should be sued by God for
slander.

Love of love
Transcends individuality.



Children of the Sun

By IPPEI FUKUDA

THE origin of the Japanese race is largely buried in that highly stimulating half-knowledge which characterizes the early beginnings of any people. Just how and when history took up where mythology left off no one seems to know for certain. We simply look on the blurred profile of the state of things lying beyond a loosely defined landmark in the course of human progress called "dawn of history." And we all think it is a shame that we should be powerless to break through the barrier and flick on the penetrating light of science to ascertain who our remotest ancestors really were and where they came from.

We were told long ago and our children are now being told by schoolmasters that the Yamato race sprang from dwellers in heaven. But the Japanese as a rule have an instinctive aversion to leaving matters in the dark. "Heaven," according to some, is but a poetic designation of wide open spaces such as a vast expanse of sea waters or prairie where the originators of the Yamato race had lived before they came over to Japan. A preponderance of opinion holds that we have a hefty strain of Polynesian blood in us. Somewhere in the mythological and migratory stage of our growth as a people, we absorbed and assimilated many racial elements so thoroughly that "even with the help of a powerful microscope, one cannot tell to-day which is which." "Our racial affinity," states Dr. Kumazo Tsuboi, a world-famous ethnologist, "is as indiscernible as mashed vegetables." However, he mentions three of the earliest settlers in South Asia, the Mons, Khmers and Chiams as having contributed freely toward giving shape to the slowly crystalizing body of a restless enterprising people before they sailed across the heaven-like expanse of the rolling seas to make the Japanese islands their home.

Dr. Tsuboi's observations remind me of a personal contact with a Malay taxi driver at Singapore years ago. During the verbal fracas over a reasonable fare for an hour's ride in his car, I became aware of the absence in the dusky driver either of the cowed docility of the Chinese coolie or of the sophisticated tolerance of the well-to-do Chinese. He demonstrated to my surprise nearly the same line of mental reaction which is peculiarly Japanese. Independence, sensitiveness and insistence on getting a tooth for a tooth were the most obvious keynotes in his fiery address. He was never wordy. A French prototype when put in a similar jam would try to reduce his customer to submission by the weight of his exhaustive eloquence while a Chinese ricscha-puller would follow you with an open palm until you give in and drop another dime in it. My bronzed antagonist of Singapore did nothing of the kind. But his brief outpouring on his outraged sense of justice had in it an intimation of reprisals which the pioneers of the Japanese infiltration into all imaginable parts of the South Seas in the 16th century regarded and often made use of as the final court of appeal whenever they despaired of finding more peaceful means of squaring their accounts with the native rulers.

Racial Characteristics

Although we look more like the Chinese than any of the Polynesian families, I think we stand much closer to the latter in the field of psychological identities. Our love of simplicity no doubt harks back to the Polynesian way of life while the world was young. Some of our old Shinto shrines are said to retain in every detail the earliest style of architecture in Japan. The pillars, walls and floors of those monumental edifices have none of the excessively ornate attributes of Chinese art. The buildings are as simple as they are fragile, invoking in our mind a tropical setting rather than the milder climate of China.

The typhoon which lashes the Western Pacific with a clock-like regularity year in and year out played an important part in bringing Japan and the South Seas together. At first, its fury tossed ashore the survivors of shipwrecks and as the advantages of the South Seas trade came to be brought home to the Japanese as well as to the Polynesians the cause of disasters was made to harness the sails of their ships of commerce. Thus the typhoon furnished our intercourse with an impetus as cause and effect.

The earliest record of our contact with the tropical regions occurs in A.D. 799 *Nippon Kohki* tells of an uncouth foreigner stranded on the shore of Mikawa Province in July of that year. Judging from the description of his scanty apparel and belongings, it is probable that he was the first Malay to set foot on our soil. The same debut of Japanese fishermen or traders in Siam or Java must have been brought about by the same typhoon when it veered round and ran its southward course. Our indirect trade with the regions of the South Seas through Chinese middlemen seems to go further back in our history. These conjectures, and many another notwithstanding, lack convincing proof to progress into historical facts, the forerunner of which appears in 1601 when Iyeyasu Tokugawa, the first of the Shoguns, sent a letter to the King of Annam. Two years later the Shogun wrote another letter to the ruler of Cambodia. It was identical with his earlier correspondence in its purport: in a polite way, the Shogun asked for freedom of trade and due protection for Japanese ships, their crews and traders while in the ports under the jurisdiction of the respective native sovereigns. The requests were made on the basis of reciprocity and records show that the Shogunate government had lived up to the promise most meticulously until the tide of anti-foreignism subsequent to the wholesale persecutions of Christians isolated Nippon from the rest of the world in 1636.

The "Red Seal" Ships

Most of our foreign trade was done by ships specially fitted out for the purpose. They went by the name of Go Shun Sen or "Ships with the Red Seal." Their appearance on the busy scene of commerce in the Western Pacific and China Sea dates back to 1592 when the most internationally minded of our statesmen in our reclusive mediæval days, Hideyoshi Toyotomi, decided to have his country participate in the increasingly important contacts with its neighbors. What the "Red Seal" was or looked like is not known as none of the seals or their facsimiles are known to exist to-day. It is obvious, however, that it was some sort of official stamp affixed on special permits issued by the Shogunate governments under the Toyotomis and later under the Tokugawas authorizing their bearers to engage in foreign trade. As many as 60 such ships put out to sea in 35 years after their advent. Almost all known ports from French Indo-China to the Malay States received them with open arms. Their visits to vaguely charted and undeveloped territories lying further south, the Philippine Islands, Borneo, Java, Sumatra and New Guinea, are said to have been less frequent.

More daring than the traders who braved typhoons and the Pacific in frail wooden boats were hundreds of Japanese who sought the fabulous profits from the South Seas trade either by smuggling or piracy. To dodge the vigilance of the government officials posted in every port of Japan, these reckless marauders had to use small junks in their itineraries over thousands of miles. For all that, we are told, the number of the unlawful traders often surpassed that of the lawful ones.

Ancient Settlements

In the wake of the growing flow of commerce between Japan and the far-flung regions of the South Seas there sprang up modest, little "Japanese towns" wherever our ships called. They were inconspicuous in size but quite eye-attracting in appearance. An old sketch of one of them in Cochin-China preserved in the Saimyoji Temple, Nagoya, shows that the Japanese settlers retained with pride their strange hair-do of the feudal period, and two swords, one short and the other twice as long, around their waists. Potted morning glories sit in the doorway as a fresh reminder of home which the poor Japanese knew they would never be able to see again. For when the Tokugawa Shogunate banged Japan's door shut in 1636 they neither permitted their people to leave her shores nor let their settlers abroad come home—a policy of seclusion most intolerant and heartless.

"Politeness is a cult with them," recorded a Dutch mariner in his diary, speaking of his impression of the Japanese settlers in the Island of Luzon, "and a point of honor would make them go through thick and thin." And through thick and thin they often went when this pet toe of theirs was trodden upon by anyone.

A notable example of their reprisals against unfair deals may be found in the sensational raid in 1628 of the Dutch Governor's official residence in Formosa, then a Dutch colony. The raid was carried out by Yabei Hamada, headman of the Japanese settlement in the island, and his men numbering 470 strong. The dispute arose from discriminatory taxes imposed by the Dutch authorities of Formosa on imports from Japan. The step, the raiders thought, clearly ran counter to the hospitality which their government and people back home had offered to the Hollanders who had been allowed to do business tax-free in Japanese ports. The incident was settled after five years of negotiation: Pieter Nuyts, Dutch governor of Formosa, and a number of his countrymen were released from a prison at Hirado, a thriving port-town in Kyushu which was to be replaced by Nagasaki in later years.

No Racial Prejudice

Minor cases of direct action of the kind occurred now and then in other parts of the southern countries no doubt partly due to the sharp-edged sensitiveness of the Japanese immigrants and partly from the failure of the non-Japanese elements to walk halfway down to meet the newcomers' sense of justice and honor. On the whole, however, the Japanese seem to have been kindly, law-abiding citizens and good-mixers among the people of their adopted countries. They had no use for racial prejudices and intermarriage was the rule rather than an exception among them.

In the official chronicles dealing with our early contact with Cochin-China is found a touching tribute to the native wife of a leading Japanese trader called Hichirobei Kodoya. After her husband's death in the Indies in 1672, the widow devoted the rest of her life to praying to Buddha for the posthumous happiness of the deceased. And it is further said that meanwhile, she never tired of writing to Kadoya's relatives in Japan, a far-off country she had never visited.

Roughly put, according to Prof. S. Iwao of the Taihoku Imperial University, the total number of the Japanese who settled down in the widely scattered towns and plantations of the South Seas areas in the first quarter of the 17th century was in the neighborhood of 10,000. Of those immigrants more than half were found in Siam where Nagamasa Yamada, headman of the Japanese settlement at Ayuthia rose to the highest office and power next only to the king. In the fierce but unsuccessful war which he waged against a pretender to the Throne of Siam and murderer of the rightful heir upon the death of the monarch not less than 800 Japanese soldiers are said to have rushed to the aid of the loyalists under his command and fought to the last man. Shortly after the defeat of Yamada's forces, the Japanese colony at this ancient capital of Siam was razed to the ground by the usurper.

Java received the thinnest quota of Japanese immigration even at its height for the simple reason that none of our "Ships with the Red Seal" could penetrate that far. Still, by 1632 there were 108 Japanese, mostly domestic servants and mercenary soldiers in the service of the local Dutch authorities. A "Letter from Jakatra" reputedly penned by a Japanese girl in a grip of homesickness for the land of cherry blossoms is regarded by many as a masterpiece in nostalgic literature. "Jakatra" is a corruption of Djajakerta by which Batavia has been known to the rest of the world before it passed into the hands of the Dutch.

Nipponese Christians

But not all of the 10,000 Japanese set out on their never-to-return journey to South Asia. Any picture of the early migration of our people would be incomplete unless a reference is made of a goodly number of Japanese Christians who had to seek asylum beyond the reach of their persecutors in their own country. As long as they felt they would be safe, it did not matter much to them where they went. It just happened that the period which witnessed an exodus of our immigrants across the Western Pacific coincided with the increasing vigor of the persecution under the Tokugawa Shogunate. It was inevitable under the circumstances that the nation-wide hunt for the victims resulted in swelling the number of

Japanese settlers in these areas with the religious refugees. When the Tokugawa alarmists turned Japan into an abject insular existence through the infamous edict of 1626, our bond of friendship and trade with the kinsmen of our ancestors was left to wither and vanish in the tropical sun.

The following quotation is from *The Menacing Sun* by Miss Mona Gardner, which is, I think, easily one of the most interesting travelogues on the South Seas.

"Yes, the Japanese!" she (A Javanese woman) said. "Why do they say they are like us? Why do they pretend we are of the same family? We are not alike, not even our faces and our bodies! Look, do we walk like them?" The little lady stumped across the floor in a withering imitation of a Japanese walking stiff-kneed on 'geta' "But if the Japanese should come down here with their warships and their army to become 'brothers,' do you think the Javanese would fight?" I asked. "Would they care?" The old lady's wispy hands fluttered to her mouth twice before she answered; when she spoke she looked at me a little scornfully. "You have walked on our streets," she said. "You have been along the road and into the market-places. Is there any strength in those people? Have they the will to resist anything? And what would they be resisting? They do not know the Japanese. The Dutch have not taught our people to hate the Japanese name, so there would not even be hate to fight with!"

Being the man in the street myself, I am not one to make light of casual comments whether they are made in an alley astride the equator or in New York. Nor do I wince at the title of Miss Gardner's book which apparently has a double meaning. The alleged designs of the Land of the Rising Sun are made to compete with the orb in the tropical sky in hurrying people into the shade. Only I remember how I and the Malay taxi-driver of Singapore looked strikingly alike with our somewhat prominent cheekbones and brushy black hair and all that. Bearing in mind the genial friendship which bound the Japanese settlers of the 17th century with the dwellers in the South Seas, I do not see why we cannot become their brothers stripped of the wary quotation marks.

Nomura Sees Roosevelt

Admiral Kichisaburo Nomura, new Japanese Ambassador to the United States, on February 18 presented his credentials to President Roosevelt in the President's office.

"There are developments in relations between the United States and Japan which cause us concern," Mr. Roosevelt told Admiral Nomura.

The new Ambassador pledged himself to do his utmost to obtain a better understanding between the two nations.

Admiral Nomura told newspaper correspondents the President had received him "as an old friend and I was greatly honored."

Admiral Nomura told the President that "recent developments in Japanese-American relations unfortunately have been such as to cause considerable concern on both sides of the ocean."

"It is the need now, more than ever, to bring about a better understanding of each other's position in order to secure the interests and well-being of our two nations, thereby preserving peace in the Pacific and maintaining the traditional friendship between us."

"Toward that end I have resolved to do all I can."

Mr. Roosevelt, in turn, told the new Ambassador, "there are, as you have stated, developments in relations between the United States and Japan which have caused concern. I welcome your assurance that in the interests of traditional friendship between our two countries and of the well-being of the American and Japanese peoples you are resolved to do all you can to bring about a better understanding."

"I am confident," the President stated, "of your devotion to this objective. I feel your long associations with American people especially qualifies you for this mission. You may be sure that I and other officials of the Government stand ready at all times to facilitate in every appropriate and practicable way your duties as Ambassador to this country."

Mr. Cordell Hull, Secretary of State, personally accompanied Admiral Nomura to the White House, instead of the usual protocol official from the State Department. The meeting lasted about 15 minutes.

Meaning of U.S. Aid to China

By WILLIAM HOSOKAWA

EVEN as these words are being written, a debate of historical proportions proceeds in Washington's Congressional halls over President Roosevelt's Lend-Lease Bill for aid to the Democracies. That the Bill will be approved and passed, even before this article appears in print, is likely in view of the current American temper. The only question is the form that the final Bill will take. It is a question of effectiveness, of whether it will carry all the blank-check powers for Roosevelt that were contained in his original version, or whether it will be emasculated by its opponents, and to what degree.

The general principle of the Bill, aid to the Democracies, is widely supported. The supporters are divided into those who would advance all aid short of war, and those who would extend still further aid which runs the risk of war. Such considerations as World War debts, the possibility of returns on future loans, the natural depressing reaction that will come to the American economic scene at the end of this effort, have gone by the boards in this new surging drive. The original proposal would do away with even the Johnson Act and the Neutrality Act, both designed to keep the United States out of foreign entanglements, and passed in a day when isolationist sentiment foresaw the need for safeguards which would resist the wave of interventionist feeling that would follow a major European war.

Somewhere along the route, China slipped into the Democratic camp, although democracy is as alien to China as Yankee Doodle. Generalissimo Chiang Kai-shek, heading the Kuomintang single party government, rules China without benefit of democratic constitution, representation, ballot or other such symbols. Nonetheless, undiscerning politicians always include the words "... and Greece and China" when they mention material war assistance to Great Britain.

The reason for China's inclusion with the Democracies is not hard to find. Japan's aspirations for a Far Eastern sphere of influence are in conflict with British and American vested interests. Japan has declared herself for the Axis. Japan is at war with China in a large way and Japan is mired. So long as Japan remains mired, her men, arms and resources are tied up and of no use to Axis plans for diverting war effort elsewhere. Thus it is to American and British interest to keep Japan occupied by assisting China materially.

In sending effective aid to Chungking, the United States takes the same risks of involvement in war that she does in furthering her assistance to Britain. American-Japanese relations have, on the surface, appeared to be more tense than American-German relations, and according to President Roosevelt the United States can carry on a war in the Pacific without greatly affecting continued support to Great Britain.

Consequences in the Far East

It is, then, the Far Eastern aspects of the Lend-Lease Bill in particular that are of interest to those who dwell in the Far East, as well as the implications contained in further American aid to China outside the scope of this Bill if the final text should not mention China by name.

Sight must never be lost of the Axis Tri-Partite Pact, which if carried out would mean that the United States is faced with a two-ocean war should she, in Axis eyes, attack any one of the three partners. Even for the United States, war on both oceans at the same time is a deterrent to determined action since her present strength is considered sufficient for only a one-front war.

American aid to China so far has been, financial, moral and material. None of these has had a decisive effect on the situation because of their non-active character, but numerous observers assert that this aid has been of tremendous value in keeping up China's will to resist. Despite several impressive loans by both the United States and Britain, China's currency to-day has depreciated from an approximate four to one ratio to about 19 to 1, that is, one Chinese dollar is equivalent to slightly more than

five American cents. Nonetheless, it is considered that American support through the exchange stabilization fund and outright loans have kept China's dollar from slipping still further.

There is little tangible to show for America's moral support, but it is claimed that this expression of sympathy has done wonders in keeping up Chinese morale, in conciliating the inevitable factional disputes and helping to give the country a national consciousness.

Materially, American resources have been available to China in the absence of the arms embargo. As a "friendly nation" she has been given access to machine tools, high test gasoline, and raw materials for armament manufacture that have been denied Japan, Germany, Italy and other nations by the license system. A few weeks ago, Col. Frank Knox, Secretary of the Navy, announced that China had arranged to purchase 100 American Naval warplanes, but nothing has been heard about their specifications, date of delivery, method of delivery or anything else.

Whether under the Lend-Lease Bill or otherwise, further assistance has been pledged to China, and President Roosevelt's personal emissary, Dr. Lauchlin Currie is visiting Chungking to discover the most effective form of help.

Questions That Arise

Assuming that (1) American efforts are prompted only by the best of intentions, that (2) America does not want war with Japan or become further involved in the Far East if she can be assured of the safety of her rights and interests and that (3) America's primary interests are in Europe, a number of questions arise, regarding America's plans.

I. To what extent does the United States intend to give assistance to China?

This same question might be applicable to the European situation. Britain has never defined her war aims outside of that of ridding the world of Hitlerism. Neither Britain nor the United States have made known whether they would consider a negotiated peace, or whether the restoration of France, Belgium, Holland, Denmark, Norway, Poland, Czechoslovakia, Luxemburg, Albania, and further restitution in the Balkans to post-Versailles boundaries is to be demanded. It might be pertinent to ask what is going to be done about Russian aggression in the three Baltic states and in Finland. Or will that be overlooked? The ultimate objective has a great deal to do with the quantity of assistance that must be provided.

By the same standards, it might be asked if the United States is going to support Chungking's oft-repeated demand that every last Japanese soldier must be driven from China and Manchoukuo back to their own islands. It is going to take a tremendous lot of assistance for that eventuality to take place, and if such an event should come to pass, it would likely be accompanied by revolution in Japan.

Also by the same standards, is the United States going to assist Chungking to the extent of removing Soviet Russian influences from Sinkiang and Outer Mongolia?

Will the United States recognize a negotiated peace in China? If not, will she continue to send arms, funds and supplies until China is strong enough to win a victory by which she can dictate her own terms? If China's manpower and American materials are insufficient, will the United States lend China her military strategists and trained personnel to operate modern equipment?

II. How available is American assistance to China?

This question also might be applied to Europe. The United States is trying to do a tremendous job of production. The national determination to send assistance abroad may be formalized in a Congressional measure, but no amount of legislation is going to produce an immediate flow of airplanes, guns, tanks, ammunition and the like. There is a world of difference between "on order" and "in full production."

The production chief of the American National Defense Advisory Commission, Mr. William S. Knudsen, has no illusions

about this situation. He says the U.S. is now attempting to produce for itself and Britain: "50,000 airplanes, 130,000 engines, 17,000 heavy guns, 25,000 light guns, 13,000 trench mortars, 33,000,000 shells loaded, 9,200 tanks, 300,000 machine-guns and ammunition, 400,000 automatic rifles and ammunition, 1,300,000 regular rifles and ammunition, 380 Navy ships, 200 mercantile ships, 210 camps and cantonments, 40 government factories, clothing and equipment for 1,200,000 men." This job, Mr. Knudsen says, will require 18 billion man-hours of labor.

The United States must divide this output judiciously between herself, for her own protection, and Britain whom she seeks to assist. By American admission, production in many lines is not up to expectations. Guns and machine-guns are still in the tooling stage, and light tanks are being produced at the rate of four per day. The hoped-for production rate of 1,000 planes per month by January, 1941, must be scaled down 30 per cent, and seven months after President Roosevelt called for 50,000 airplanes, only about 50 combat planes were delivered to the U.S. Army in December. These are cold, undenied facts.

The Problem of the Navy

The situation is more cheering regarding the Navy. The two-ocean fleet, declared to be vital to American safety, was scheduled to be completed by 1947, but the bulk of the new ships are expected to be ready two years earlier. Still, that is four years in the future, and this year the U.S. Fleet will get only one battleship, two aircraft carriers and eight destroyers of the scheduled total of 17 battleships, 18 aircraft carriers, 54 cruisers 81, submarines and 206 destroyers.

Japan is still a first rate power, and only the best or close to the best equipment will suffice for the Chinese, be it warplanes, machine-guns, tanks, anti-tank guns or artillery. It takes trained experts to operate modern equipment. China needs just the things that Britain needs to stop Germany and the United States needs to rearm her forces. Can the American arsenal supply all three, four including Greece? Of course, out-dated weapons would be of considerable value to the Chinese inasmuch as the Japanese are using equipment of this kind while saving their newer models. But this would be indecisive assistance, serving only to prolong a stalemate which Japan as well as China seems capable of withstanding for much longer.

III. How will the United States make supplies available to China?

Supplies are going into China by several routes, most of them minor in importance. The largest and best-known is the Burma Highway, where trucks burning into the limited supply of gasoline carry three or four tons at a time over tortuous and none too good highways. It is a long, tedious process, with a bottleneck at the Mekong River crossing where, according to latest American reports, the bridges have been badly damaged and ferries are being used.

There is also the old Russian route, traversed by camel caravans since centuries past, and capable of carrying only as much as camels can bear, transported at the speed that camels can travel. Air transport in China is still ineffective, and the small amounts that are smuggled into Chungking territory through various channels are not significant in the broad picture.

But that is only a part of the problem. The largest difficulty is getting supplies to China in the first place. There is a world-wide shortage of merchant shipping which heavily-taxed American yards are trying to remedy. If the difficulty of obtaining cargo space for the Far East should be overcome, Japan might formally declare war and claim belligerent rights of blockade. Japan has the ships to keep Far Eastern waters under close watch, and it is a dubious matter for America to challenge this blockade so far from the main Hawaiian base.

Transportation of supplies to Britain is a big problem now, since American ships are being kept out of the war zone, and there must be far-reaching changes in policy if this restriction is to be removed. Under Japanese blockade the problem will be quite as difficult in the Far East, especially since the distances involved in the Pacific are about twice as great.

IV. Is America willing to face the consequences of a Chinese triumph and a crushing Japanese defeat?

The Problem in China

Even among China's best friends, there is doubt as to her ability to keep order should Japan, which stands as a symbol

against which national resistance is directed and national energies united, suddenly be removed from the scene. Rather, a more gradual change is seen as the Far East's need. Sino-Japanese co-operation, with their respective influences in logical proportion is the ideal envisioned by farsighted Chinese as well as Japanese leaders. Just as Americans desire that post-war Europe should provide opportunities for free economic intercourse and remove material want—two of the fundamental reasons for the desire to expand national boundaries—a similar state of affairs is necessary if the foundation for lasting peace is to be laid in the Far East.

There is the acute danger of a new outbreak of internal strife in China should China's one common danger, in the presence of which domestic differences have been subordinated, be suddenly removed. The resultant chaos would be every bit as dangerous to world peace and American interests and opposed to humane considerations as the present strife. The United States would then face the undesirable task of coming into China and setting the house in order, and to protect the rights that she seeks to maintain now. This would be a job in conflict with American principles, but a job which would have to be done to defend the progress made in defeating Japan's ambitions.

When one considers the dispatch of vast American forces to China to enforce the peace that China herself cannot keep, the responsibilities that appear are overwhelming.

It cannot be imagined that Russia would remain quiet for long if Japan's position became weakened. Russian aggression in Finland, Latvia, Lithuania and Estonia, and Russian seizure of Polish and Rumanian territory has revealed that the Soviet Union is not averse to extending boundaries whatever the reasons advanced. In Russian plans an ice-free port in the Pacific has been long desired, and the large forces known to be concentrated in areas near Manchoukuo would not be slow in swinging into action. Here would be another potential source of aggression that the United States would have to combat to be consistent.

These are but a few of the considerations that are attached to further American involvement in Far Eastern affairs. The issue has manifold considerations, and each must be weighed carefully if a course that entails no future regret is to be chosen. American interests at stake in the Far East do not begin to compare with those in Europe. Yet it is not consistent to single out Europe for intervention while letting the Oriental difficulty slide. Before the Tri-Partite Pact it was possible to view the two conflicts separately. Now they have direct ties, and sight must never be lost of this fact.

Costs to be Counted

While being true to ideals, however, it is essential to be aware that powers other than the United States and Japan are interested in causing war between the two. For the two principals, there is no possible gain in war. History has shown that nothing is ever decided by war, and this would be only too true of an American-Japanese conflict. Neither side is assured of a clear-cut, decisive triumph, and the victor, whichever it may be, could never find the spoils of war worth the price. On the other hand, war in the Pacific would change the European set-up to the great advantage of one belligerent and to the disadvantage of another.

It is considered, and correctly, that responsible elements in both Japan and the United States seek by every means to avert a head-on clash. Other elements are not in sympathy. The way is precarious, and steps must be chosen with care.

The world has been apprehensive of a Japanese military thrust at Singapore and the Netherland Indies. In reply Tokyo has claimed that her interests southward are economic, not territorial and political. Under the present state of affairs it is thoroughly possible that Japanese military action in this direction, whether or not in conjunction with a German drive in Europe, will throw the United States into war.

The possibility of such Japanese action can only be guessed at, but it is likely that effective American aid to China would stimulate rather than retard this contingency. The international game is far past the bluffing stage.

The Far Eastern situation was brought to the crux by Japan's adherence to the Axis. This move did not come about without considerable soul-searching in Tokyo. It was a choice made of necessity, because the Axis at the time seemed to offer greater hope of Japanese advancement than Britain and the United States,

(Continued on page 51)

Industrial Development in China's Interior

The scope of the following survey of industrial conditions in the interior of China is far too great for any investigator to have travelled over the whole area or to have made personal visits of inspection to many of the places described. The author and the Editor wish to emphasize that the information compiled in large measure was obtained from reports and statements given by Chinese officials of various departments of the Chungking Government and from officials in the provinces.

By DAVID S. SMITH

THAT China's industrial activities in the interior provinces have been greatly developed in recent years, especially in 1940, is evidenced by the large numbers of new factories established in Szechuen, Kweichow, Yunnan, Hunan, Shensi, Kwangsi, Kwangtung and Chekiang Provinces. In 1940, it was estimated by Dr. Wong Wen-hao, Minister of Economic Affairs at Chungking, that the industrial and mining production was valued at \$1,050,600,000. This figure represents the fruit of close co-operation between private enterprises and the Ministry of Economic Affairs, which directs the nation's industrial and mining activities.

Of the \$1,050,600,000, private industries accounted for \$255,600,000, including \$42,600,000 from metallurgy, \$21,700,000 from mechanical industries, \$11,800,000 from electrical industries, \$21,300,000 from chemical industries, \$119,300,000 from spinning and weaving, and \$38,900,000 from food industries. The value of production in government-owned factories reached \$55,000,000. The output of mines is valued at \$370,000,000 worth of tungsten, tin, antimony, mercury, copper, and other minerals. The above figures do not include home industries and small enterprises.

The mainstay of industrial and mining production in the interior provinces of China is formed by 448 private factories and the mines and government-owned enterprises. More than 120,000 tons of machines have been transferred to interior China since 1937. The value is estimated at \$360,000,000. More than 70,000 tons were transported with financial help from the Ministry of Economic Affairs' Industrial and Mining Adjustment Administration. The rest was shipped at owners' expenses or with help of other government offices.

Of the 448 private factories moved to the interior, 254 are in Szechuen, 121 in Hunan, 27 in Shensi, 23 in Kwangsi, and 23 in other provinces. More than 12,000 skilled workers and foremen were imported from the coastal cities with financial help from the government. About 6,000 tons of materials to equip these factories were imported from abroad with foreign exchange supplied by the government at official rates. Many of these factories and mines are government-operated, most of them newly established to meet war demands. One of them is the Central Machine Works which is turning out 2,000-kilowatt turbine electric generators for power stations in the interior. The government has also a number of electric equipment factories, radio equipment factories, copper refineries turning out 99.95 per cent pure copper, alcohol distilleries, vegetable oil-cracking plants, chemical works, and other factories. More than 10,000 tons of machinery have been added to these plants in addition to equipment brought from coastal cities.

Metal Production

The government operates copper mines in Szechuen, Sikong and Yunnan. A \$50,000,000-tin concern has been organized to develop tin mining in Yunnan, while part of the Hunan and Kwangsi tin reserves are worked by the government. A large number of coal mines are government-operated. Among other things, they are supplying the new railways in Kwangsi, Hunan and Yunnan. Twelve power plants have been established in as many cities. They have a combined capacity of 20,000 kilowatts.

Private enterprises are also progressing rapidly. Machines for Szechuen's modern paper mills are all made in China's new machine shops. Two of the mills are already producing, while another two mills will begin production next spring. Factories brought 200,000 cotton spindles to the rear, 160,000 of which are in Szechuen. A new industrial center has been established in Szechuen Province. In this district are found private woolen

mills, dye factories, alcohol distilleries and others. They established a power house to supply electric power for their own use. They have their own waterworks, wharves, and roads leading to national and provincial highways. The factories have a special committee handling affairs of common interest with the help and direction of the government.

As to the production of steel, and iron, it was expected that by the end of 1941, China will have sufficient to meet most of her military and industrial needs in the interior. At present, the output is still far from self-sufficient. In 1940, the production of steel and iron increased by 30 per cent when compared with 1939. During the next few months, four-fifths of the new furnaces will be ready for operation and by the end of 1941 the nation's production of iron and steel will reach its maximum capacity in accordance with a preconceived program. For many months in the past, experts have been experimenting on 3-ton, 5-ton, 10-ton and 20-ton furnaces to suit wartime conditions. A number of these furnaces are already operating, while others still require technical perfection. The officials expect that June of 1941 will be the turning point in the history of heavy industry in China as then most of the furnaces will be properly installed for operation.

In the following an attempt is made to describe briefly the industrial conditions in the different interior provinces during 1940.

Szechuen Province

On the eve of the outbreak of the Sino-Japanese war, Szechuen had only 20 power plants with a total capacity of 5,468 kilowatt hours and a capitalization of \$4,000,000, of which the 3,400 kw. hours Szechuen Power Company was the largest. To-day, the Chungking Power Company alone has a capacity of 12,000 kw. hours, in addition to its supply of high power industrial current. The National Resources Commission, in charge of all hydro-electric projects of the nation, is erecting five power plants along the different rivers in Szechuen. Besides these, various government and private factories have erected their own power plants with a capacity ranging from 750 to 8,000 kw. hours. Before the hostilities, hardly any modern furnaces for iron and steel making operated in Szechuen. Up to June, 1940, Szechuen was the home of a dozen modern iron and steel making plants, most of which were running at full blast. This does not include machinery brought from the coast to the province. The Ministry of Economic Affairs has installed a 20-ton iron blast furnace in Szechuen where production has been resumed. In addition, it is erecting a plant which, among other things, will house a 100-ton iron blast furnace, two 25-ton Siemens-Martin furnaces, one 10-ton and one 5-ton Siemens-Martin furnaces, and 1½-ton electric furnace. The production of pig iron by native methods has increased. An estimate reveals that there are 150 pig iron furnaces in Szechuen and Sikang provinces. Szechuen's annual iron production in prewar years was 20,000 tons.

The development of mechanical industry in Szechuen Province was of minor importance to the nation before the war. Through government encouragement, many factories have moved to the interior since the war began. Szechuen at present is the home of 61 per cent of China's mechanical industry. Manufacture of military equipment and supplies is the most important activity of Szechuen's mechanical industry at present. At least 100 private machine and metal shops are engaged in making simple military supplies for the government which furnishes them with raw materials and buys their finished products on a piece rate basis. Their combined capacity equals that of a large arsenal. These factories are also busy making and perfecting different industrial machines,

tools and equipment. Some large plants are engaged in producing more complicated equipment like paper and dyeing machines, transformers, motors, or Chinese typewriters. Emphasis is placed on building and repairing ships, making textile machines and metallic goods of all kinds.

Increased Cotton Output

Big increases in cotton production expected in Szechuen in 1940 will bring the province to the border of self-sufficiency. Szechuen's pre-war annual cotton production was estimated at 800,000 piculs. The demand of the province, however, was somewhere around 1,200,000 piculs each year. In compliance with the call for self-sufficiency in cotton for south-west China, the Central Agricultural Research Bureau, assisted by the Szechuen Farm Products Improvement Committee, in 1938 started to increase and improve cotton production in Szechuen, especially since the climatic conditions and soil are particularly suited to cotton growing. Considerable increases were registered during the past two years. The beginning of 1940 saw the extension of the cotton promotion program over 57 counties. The imported variety of Delfos was grown on 125,616 *mow*; Trice on 113,709 *mow* and Chinese cotton of superior quality on 13,600 *mow*.

At present, there are four modern cotton mills with a total of 300,000 spindles in the neighborhood of Chungking alone. The Yu Foong Cotton Mill from Shanghai operates 30,000 spindles. A further 27,000 spindles are being installed while an additional 100,000 British-made spindles are *en route*. The factory has 240 big weaving looms but the majority of its production of yarn is consumed by the numerous small weaving mills in the province. With a capital of \$12,000,000, the company made a profit of between \$4,000,000 and \$6,000,000 in 1939 and 1940.

In addition to the numerous factories established in Szechuen province during the past few years and large sums of capital invested in them, a second instalment of \$40,000,000 of the One Hundred Million Szechuen Provincial Development Loan was issued in the latter part of 1940. The proceeds are used, in part, as follows: \$6,000,000 for promotion of enterprises undertaken by the Szechuen Development Corporation, \$1,800,000 for railway and highway construction, \$8,000,000 for promotion of agriculture, afforestation, water conservancy, mining, communications, land reclamation and public health, \$2,500,000 for land surveys and administration, \$5,000,000 for stabilization of commodity prices and promotion of co-operative enterprises, \$1,000,000 as security for payment of dividends on industrial and mining enterprises. Proceeds of the first instalment of the loan issued in the early part of the year were used for the promotion of economic enterprises, including: \$5,000,000 for railway construction, \$500,000 for promotion of enterprises undertaken by the Great China Industrial Corporation, \$200,000 for promotion of enterprises undertaken by the West China Land Reclamation Corporation, and \$300,000 for promotion of other economic reconstruction enterprises. In the early part of 1941, a Hsin Yeh Company was organized to develop industry in Szechuen. Capitalized at \$70,000,000, the company will open mines and factories. Of the total capital, \$30,000,000 was subscribed by the Central Government, \$7,000,000 by the Szechuen Provincial Government, \$3,000,000 by the Sikang Provincial Government and the remaining \$30,000,000 by the general public.

Yunnan Province

Yunnan is not so important as an industrial region but is a mining district, as its industries have not been developed on a large-scale. Kunming, the provincial capital, has a power supply of only 7,200 kilowatt. The Ministry of Economic Affairs and the provincial government have started several big hydraulic power plants, the completion of which will mean a new era of cheap power supply and industrialization. Most of the industries cluster around Kunming which is the chief market and transit center for commodities of all kinds. Yunnan and its neighboring territory enjoy a prosperous trade under normal conditions. Yunnan's tea, silk and minerals find a good market in Burma, Siam and French Indo-China, which in turn sell cotton and rice to the province. Yunnan is rich in mineral wealth. This southwestern border province tops the nation in the production of tin and copper. Its other mineral reserves are important factors in the reconstruction program of interior China.

The most important mineral is tin. Two modern and 200 native companies are mining tin reserves in southern Yunnan, producing 9,000 tons each year which represent 90 per cent of the national production. The metallic content of Yunnan tin ores differs from 0.1 to 80 per cent and may be concentrated to 50-90 per cent after washing. A smelting plant established in 1932 produces tin ingots, 99.2-99.4 per cent pure. They are exported in normal times to Hongkong, London, New York and other foreign markets. The total amount of exports exceeds \$30,000,000 per year. In 1938, Yunnan shipped abroad more than 9,000 tons of tin slabs, mainly to Great Britain. In 1939, its tin exports increased to more than 10,000 tons and they are still rising. It also exports considerable quantities of antimony and tungsten. Gradual nationalization of Yunnan's valuable tin production was foreshadowed by the formation of the Yunnan Tin Corporation, a joint enterprise of the Central Government and the provincial authorities. Chinese tin, mainly from the Kochiu mines and smelters in southern Yunnan, serves as security for the second American loan to China amounting to U.S.\$20,000,000. The most important feature of the amalgamation scheme will be the extensive use of modern mining and smelting equipment in the Kochiu mines. The numerous native furnaces will continue to operate as before, but their output will be re-smelted in big purifying reverberatory furnaces of the corporation for export. These furnaces were designed by Mr. S. B. Archdeacon, British technical adviser. Tin slabs from the Kochiu mines are of fine quality and compare favorably in the world market with products from other tin-producing countries. There are to-day 100,000 miners working in the mines around Kochiu. It has been estimated that the livelihood of no less than 1,000,000 people depends on tin. Annual tin export net the provincial authorities anywhere between \$30,000,000 and \$40,000,000, depending on foreign exchange rates and the price of tin in the international market. Mining and trading of tin in Yunnan is a monopoly, the official price paid by the provincial bank to the native miners being \$5,020 for 1,000 catties.

Copper is produced in more than 80 of Yunnan's 132 counties, with the most important centers in the northeastern corner of the province. Yunnan copper used to supply the needs of the entire country and for centuries was brought to the Peking Imperial Mints for the manufacture of copper coins. The present output is 500 tons a year, or 80 per cent of the national production. The average metallic content of Yunnan copper ore is about five per cent.

Kweichow Province

Efforts to industrialize and develop Kweichow Province have been given impetus following the organization of the Kweichow Development Corporation. The corporation was inaugurated in June, 1939. Less than one-third of its \$6,000,000 capital was furnished by the Kweichow Provincial Government and the Industrial and Mining Adjustment Administration. The corporation set out, one month after its establishment, to explore gold in the Fantsing mountains in the eastern part of the province. With an initial investment of \$100,000, it soon began prospecting and drilling. The work has progressed to the stage of smelting and refining, and gold is expected to be produced in large quantities soon.

The corporation also set aside \$1,000,000 in January, 1940, for the importation of 20 trucks for freight and passenger services on the inter-provincial highways. These are being rebuilt and refitted to have gas replace gasoline for fuel. They were put on the Szechuen, Yunnan and Kwangsi run in the middle of June. In view of the need of raw materials and commodities in the province, the corporation next opened, with \$400,000 a purchasing and sales department. The corporation has now gone one step further by setting up at the cost of \$50,000 a chemical works for the production of soap, candles, ink, gum, tooth-paste and face powder. Soap has been put on the market, to be followed by other products. It has also erected a glass factory at a cost of \$90,000, and its products have been sold in the market since May, 1940.

In addition, the corporation has controlling interests ranging from 60 to 90 per cent in the following enterprises: The China Machine Works, the Kweichow Lumber Mill, the Kweichow Match Factory, the Kweichow Printing Factory, the Kweichow Oil Refining Factory, the Kweichow Silk Weaving Factory, the Kweiyang Architectural and Building Company, the Kweichow

Tobacco Company, and the Kweichow Oil Industrial Works which turns out oil, cloth and printing ink. The works hopes to produce paint in the near future. To help increase their production, the corporation has invested money in the following enterprises: the Kweiyang Electric Works, the Kweichow Mining Administration, the Eastern Kweiyang Coal Mining Company, and the Ta Shing Flour Mill.

The Kweichow Mining Administration was established in September, 1938, to mine quicksilver in the province. Its output was expected to reach at least 400 tons at the end of 1940. The increase in production thus set by the firm is ten times its original annual output. Efforts for the exploitation of Kweichow's mineral resources are not limited to quicksilver alone. Gold, iron, coal and tungsten which are found at many places in the province, are also produced in greater quantities than hitherto. Gold is being produced in river beds in Liping, Chinping and Tienchu districts in the eastern part of the province. People who dwell there get their living by washing gold. Farmers also join in gold production during their spare time.

Hunan Province

The construction department of the Hunan Provincial Government is fully utilizing the Chinese Industrial Co-operatives for the promotion of handicrafts in the province including hand spinning and weaving, paper-making, sugar-manufacturing and ramie weaving. To these co-operatives, the Hunan authorities extended a loan of \$20,000,000 in 1940 together with the banks. A total of 26 hand spinning and weaving factories have been opened in twelve cities and rural towns in the year, excluding those not yet registered with the construction department. For the improvement of paper-making industry, a corps of experts has been organized to give technical instructions. Thirty paper-making counties have been divided into four districts, where the corps, with the aid of the co-operative enterprises administration, plans to modernize the old Hunan handicraft.

Among the factories which have been enabled by the authorities to resume work is the Hunan First Spinning and Weaving Factory. Established nineteen years ago with 40,000 spindles, it was run by merchants for about five years, when it was taken over by the government for general improvement. The spindles were later increased to 50,000 and the weaving machines to 248. In 1938, 10,000 spindles and all weaving machines were moved to a comparatively safe place. Bombed twice before it ever began work, the Second Hunan Machine Factory started operation in the latter part of 1940. As a precaution, the buildings are separated from each other at a fairly good distance. The plant has its own supply of current. Like its first factory, it makes automobile parts, tools and machinery needed for new industries. It produces also good Chinese steel. The first machine factory has had a history of 28 years, specializing in manufacturing automobile parts and steel tools. Since its removal from Changsha to its present site in the latter part of 1938, it has been manufacturing munitions.

Forced out of its original site in Yuankiang on the shore of the Tungting Lake, the Hunan Alcohol Factory has been split into two temporary plants both of which are putting out 20,000 gallons of alcohol each month. The first temporary plant was set up in March, 1939, while the second in May. The factory was compelled to move out of Changsha in the latter part of 1938. With a \$100,000 loan provided by the Ministry of Economic Affairs, the only paper-manufacturing factory, equipped with fine machinery, which also evacuated from its original site in north Hunan owing to the hostilities, is being set up in its new site for an early resumption. A cement factory, and a factory for the manufacture of electrical equipment are among the new plants the construction department plans to start.

Shensi Province

Shensi had 60 modern factories in operation during the first half of 1940. They are capitalized at \$9,874,000 and have more than 10,000 registered workers. The value of the production of these factories is estimated at \$7,000,000. Industrialization of Shensi is comparatively recent. The province had only six small factories before the western section of the Lunghai Railway reached Sian in 1934. The easy transportation provided by the railway stimulated the province's industrial development, and 28 factories

were established between 1934 and July, 1937, immediately before the outbreak of the Sino-Japanese war. The war and the evacuation of Shansi, Honan and Hankow factories added 26 new plants in the province, bringing the total to 60. Among them are 11 cotton mills capitalized at \$5,620,000, seven flour mills capitalized at \$1,050,000, six chemical works capitalized at \$359,000, ten machine shops capitalized at \$170,000, seven leather tanneries capitalized at \$37,000, and 19 miscellaneous factories capitalized at \$2,638,000. Except one factory in northern Shensi and five in southern Shensi, the remaining 54 factories are all situated in central Shensi on both banks of the Wei River, a tributary to the Yellow River.

The cotton industry is best developed in Shensi as the province is the nation's leading cotton producer. The 11 cotton mills are all situated in the central Shensi cotton belt. The largest of them is the Tahua Cotton Mill with an initial capital of \$2,500,000. Established in March, 1936, the factory has 25,136 yarn spindles, 1,120 thread spindles, and 820 looms, which are run by a 2,000-kilowatt turbine generator and two steam engines. It consumes 9,000 piculs of raw cotton each month and produces 150 bales of yarn, 35,000 bales of ordinary cloth, and 10,000 bales of fine cloth, worth a total of \$2,000,000. Profit of the factory in 1939 was \$8,000,000. Part of the factory was bombed by the Japanese in October, 1939, and it is working with 15,000 spindles in 1940. Shensi has three plants for the packing of its abundant raw cotton. They are the \$500,000-Weinan Packing Factory and the \$100,000 North-west Packing Factory at Weinan, and the \$500,000-China Packing Company at Hsienyang. The total production of the three packing plants is 20,000 bales of raw cotton worth \$250,000.

The province has five match factories, three in central and two in southern Shensi, with a total capital of \$214,000 and a monthly production of 3,740 cases of matches. They supply Shensi and southern Honan markets. Another important Shensi factory is the \$60,000 alcohol plant at Paocheng. Financed by the Chinese Industrial Co-operatives and directed by the former staff of the now dissolved \$600,000-Hsienyang Alcohol Plant, the Paocheng factory is the first of the Chinese Industrial Co-operatives' north-west liquid-fuel-chain project. It produces 7,800 gallons of 96 per cent pure alcohol each month. Additional machines installed in the latter part of 1940 doubled the production of the plant.

Chekiang Province

The establishment of model factories and the organization of advisory and supervisory committees are among the important steps taken by the Chekiang authorities for industrial development of the province. Among the first government factories established in Chekiang after the spreading of hostilities to the province was a machine works. Equipped with machines removed from a similar plant in Hangchow and with new equipment imported from abroad, the works began functioning in the spring of 1938, specializing in making charcoal burning engines and paper-manufacturing machines. Small machines have been organized in 1940 to produce boring lathes, planing machines and turner's lathes. With the Eastern Chekiang Power Plant as the main source of power, six branch plants have been established, the biggest having a capacity of 200 kilowatts. The National Resources Commission is also taking part in these efforts. After an examination of the Eastern Chekiang Power Plant, which was established in July, 1938, it decided to invest three-eighths of a capital of \$400,000 for the extension of the plant. Five-eighths of the capital are supplied by the Chekiang provincial government. The erection of hydraulic power plants has been included in the development program.

In co-operation with the Ministry of Economic Affairs, the provincial government built a chemical factory. Using the lead chamber process, the factory is producing two tons of 66 per cent nitric acid, one and a quarter tons of hydrochloric acid and 750 kilograms of caustic soda. Model weaving, dyeing, stationery, printing and paper factories and a model flour mill were established in 1940. None of the plants is fully equipped with the necessary machines and some are small in size. Medical cotton, gauze, underwear, clothing material and flour are produced by these factories. A cotton mill, equipped with 1,000 spindles, was erected in the latter part of 1940.

Chekiang suffered heavily because of the war. The losses to its industries are estimated at \$100,000,000. Few of the 263 registered big factories, with an aggregate capital of \$12,000,000,

escaped damage or destruction. These exclude 70 public utility enterprises which were either damaged or destroyed in the province.

As to handicrafts, Hanchow alone before the war had 5,000 home weaving machines. Over 1,800 of these operated with electric current. At present a total of 508 registered factories are functioning in the part of the province which is not occupied by the Japanese. They include 59 power plants, two flour mills, 14 iron foundries and works, 28 cotton weaving mills, 21 soap, 28 leather tanneries, 36 printing, 18 canned food, two cotton spinning, four sugar-manufacturing, seven match, seven dry-cells, five glass, 18 knitting, three silk and four milk products factories.

Kwangtung Province

During the past two years many new factories were established in those parts of Kwangtung, which are not occupied by the Japanese troops. Of these factories, the following are considered of great importance: (1) The Kwangtung Machine Works, which was established more than one year ago and with a moderate capital of \$110,000, is repairing machines and building new ones for the local alcohol distilleries, dry-cell factories, match factories and pharmaceutical factories. The factory is manufacturing 3,000 handcars and 3,000 vegetable oil lamps at the present time for military use; (2) The Dry Cell Factory, with a capital of \$33,000 was established in 1939; (3) The Soap Factory with a capital of \$76,000 was founded in March, 1939; (4) Agricultural Implements Manufacturing Plant with a capital of \$64,000, was established in the latter part of 1939; (5) The Paper Mill with a capital of \$42,000; (6) The Alcohol Distillery with a capital of \$76,000; (7) The Pharmaceutical Factory with a capital of \$160,000. In addition, the Kwangtung provincial government is making plans to open a match factory, a glass factory and a cotton mill in 1941. The aim of this industrial development in the province is to supply the daily necessities to the people in the province, so that they do not have to import from the occupied areas or foreign countries.

Kiangsi Province

In Kiangsi Province, 26 new factories were established since 1939, of which four were power plants, supplying electric current to different factories, one was a large machine works, producing automobile parts and others turning out cotton piece goods, leather goods, indigo dye, medical supplies. The old porcelain kilns at Kingtech, which produced the finest pieces of porcelains in the Imperial days, have been brought up-to-date and turn out china-ware of every variety and grade. Scores of articles of daily consumption are made by the provincial handicrafts association, a body which embraces 11,000 producers in home workshops whose output is bought up and marketed by the government. The provincial government is planning to build a sugar-refinery in 1941. Plans are being made to produce steel by using Kiangsi coal and iron. A plan is under way to use the rough local fibers, which are used to produce only rope and coarse sacking, into a fine yarn several times as strong as cotton.

The above account gives briefly the industrial condition in the interior provinces and the efforts made by the authorities to industrialize the country. In this brief account, it can be noted that the authorities are not trying to build large factories. Instead, they are building small factories in large numbers and have them scattered in different localities. This will not only solve the problem of concentrated aerial bombing by the Japanese but also aims to make each individual district self-sufficient. Handicraft industry is encouraged everywhere and the Chinese Industrial Co-operatives which have developed into a gigantic industrial movement in the interior is producing \$4,000,000 worth of articles of different kinds monthly. With this industrial program carried out in the interior, after the war, the coastal cities, such as Shanghai, Canton and Tientsin will not remain the industrial center of this country, which will bring about a tremendous change in the economic condition of these cities.

Meaning of U.S. Aid to China

(Continued from page 47)

nations whose interests in the Far East conflicted with Japan's. If the interests of these three countries were made compatible in East Asia, the only world area where Japan is concerned, the cause of their differences naturally disappears.

At first glance this seems an impossibility, none of the three being willing to modify their policies, and Japan firm in the Axis camp. However, there are still pro democratic blocs in influential Tokyo circles, not least among them the powers that secured the approval of democratic Admiral Nomura as Ambassador to Washington and kept able Ambassador Shigemitsu at London when his colleagues were being shifted.

The need now is a little diplomatic give-and-take. This is impossible while nations remain adamant and speak bravely of immutable policy and futility of appeasement. Yet it must be remembered that there never has been an immutable policy that did not yield to necessity, and appeasement must not be confused with sensible diplomatic bargaining and compromise. Some of the most brilliant diplomatic strokes in history were brought about by these tactics.

How Peace is Defeated

Democratic-Japanese rapprochement does not necessarily mean betrayal of China. There need be no question of seeking to justify this understanding if peace can be arranged between Chungking and Tokyo, and this is not so fantastic as it may sound. It is no secret that peace overtures were made by Japan last fall just before the Nanking régime was recognized. According to reliable reports, a settlement was almost at hand when negotiations suddenly collapsed. Avowals to the contrary notwithstanding, peace would be welcome to many alleged determined-resisters in Chungking as well as Tokyo.

Continued foreign support has helped repress this peace sentiment in Chungking. But now if it can be seen that a compromise peace, desired by the two belligerents, will react to the advantage of both Britain and the United States, there can be no grounds for continued opposition to such negotiations. It would be to great democratic interests to urge this peace, assist in an equitable solution along a framework similar to the planned post-war European system respecting territorial boundaries and assuring freedom of economic enterprise, and reap the resulting benefits.

Whether the realities of the situation, human stupidity and perverseness, hallowed precedents and other factors will allow for any such far-reaching action remains to be seen. Admittedly the future is dark, but it need not be if men of will and intelligence with a love for peace would strive unselfishly and with benevolent regard for fellow man.

As for Americans, if their duly constituted representatives in Congress will that President Roosevelt's Lend-Lease Bill shall be approved, it is their patriotic duty under contemporary standards, to give all their energy toward carrying out that program. But it is only wise to consider at this time that perhaps force is not the only weapon with which to fight force, that perhaps there are better, less costly, more humane, more far-sighted measures. It is no longer valid to say war must be avoided at all costs; it is eminently sane to try to avoid an avoidable calamity.

Huge New Dam Planned

A dam comparable in scale to the famed Boulder Dam in the United States will be constructed on the Gumma-Fukushima border about 180 miles north-east of Tokyo, according to the *Nichi Nichi*, which says that a super electro-generating plant will be built at the base of the proposed dam to relieve the current shortage of electric power.

The entire Ose plain, a mile and a half wide and four miles long, will be converted into an artificial lake. Power generated at the projected plant will be very cheap because the dam will be four times as high as any in Japan and water will have to be piped through conduits for but six miles.

Plans for construction of such a dam were first prepared by the Board of Electricity of the Communications Ministry in 1938, but considerable opposition was waged by botanists and geologists who claimed that the plain abounds in rare plants and promises to yield much coal.

Now that the plans have been passed by the Diet, survey work will be begun immediately and completed next year. Construction work will get under way in 1943 and the first part of the project will be completed three years later.

Irrigation in the Netherlands Indies

By IR. W. A. VAN DER MEULEN, Civil Engineer

(Bulletin of the Colonial Institute, Amsterdam)

THE surface area of the Netherlands Indies totals 1,900,000 km² or 735,000 square miles and the number of its inhabitants is estimated at 70 million, 68 million of whom are natives.*

Java and Madoera jointly cover 132,000 km² or 51,000 square miles, and are estimated to have at present 48 million inhabitants of whom 47 million are natives. Madoera (5,400 km² or 2,085 square miles) is separated from Java by a narrow strait: hence it practically forms part of that island, and is reckoned as belonging to it also from an administrative point of view.

From the above figures it follows that these two islands support a population of 364 souls per km² or 941 per square mile. The remaining islands of the Netherlands Indies, which jointly go under the name of the Outer Provinces, measure 1,768,000 km² or 684,000 square miles, have a population of 22 million and hence a population density of only 12.4 per km² or 32.2 per square mile. Obviously, then, Java and Madoera together form by far the most important part of the archipelago and it is therefore not surprising that, so far, activities in the field of irrigation have been concentrated chiefly on these two islands.

Java is situated a few degrees below and parallel to the equator; it is 1,000 km or 620 miles long and 56 to 105 km or 35 to 65 miles broad. On the North it is bounded by the Java Sea and on the South by the Indian Ocean, which fact has endowed it with a definitely tropical marine climate, that is, with high, even temperatures, plentiful rainfall coming, as a rule, in heavy showers, and mainly moderate winds. The most prevalent of these latter are the rain-bearing North-West trade-wind and the South-East trade-wind, the latter bringing dry air from the desert areas of Australia. The wettest season is from November to April, the driest from June to September. The mountains of Java are mostly volcanoes, some of which are still active, and to these the island owes its great fertility.

The island of Java not being very broad, its rivers are not very long nor their basins very extensive. The longest is the River Solo (540 km or 340 miles), which flows chiefly parallel to the main axis of the island. Most of the rivers contain very little water during the dry season (the East monsoon), whereas during the wet season (the West monsoon) they bear enormous floods known as banjirs. Some of them are exceptions to this rule, however, and discharge a considerable amount of water even during the dry season. This may be due to the river-basin being favorably situated from a climatological point of view or abundantly wooded, or to the qualities of the soil in its upper reaches. Take the slopes of active volcanoes—these are generally very porous: which means that part of the water which falls on them during the rainy season immediately penetrates the soil and flows slowly underground, only emerging at the foot of the mountain during

the next dry season as spring water feeding the rivers. Striking instances of this are furnished by Mt. Klut and Mt. Merapi. During the flood seasons the rivers on the slopes of these volcanoes often present the curious phenomenon of being in spate in the upper reaches, and a few km lower down dry but for some foam!

The following table shows the highest and lowest discharge of the chief rivers of Java as well as the area of their several basins.

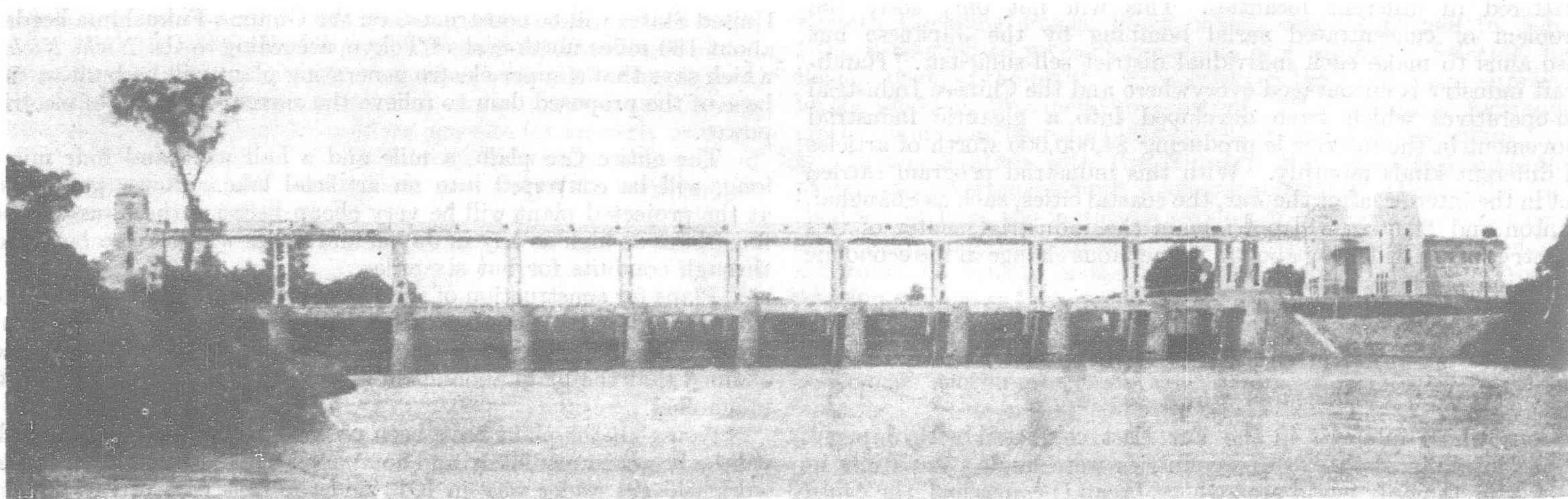
Name of the river	Area of basin in square miles	Approximate discharge per second		
		Normal highest discharge cub. feet	Extraordinary floods cub. feet	Normal lowest discharge cub. feet
Tjioedjoeng	665	35,000	62,000	710
Tjitaroem	1,500	40,000	—	990
Tjimanoeck	1,280	25,000	34,000	600
Pemali	340	25,000	34,000	250
Tjomal	290	20,000	65,000	600
Toentang	240	25,000	39,000	600
Serang	326	18,000	70,000	600
Solo	5,950	70,000	90,000	810
Brantas	4,250	40,000	60,000	2,610
Sampean	462	18,000	95,000	390

It appears that the river Brantas shows the most favorable relation between normal lowest and normal highest discharge. In its basin is situated the above-mentioned volcano, Mt. Klut, and into it is discharged the water from vast tracts of still thickly wooded mountain country. The yearly East monsoon discharge of the river, which is 310 km or 190 miles long—the longest river but one in the whole of Java—is steadily decreasing, due, it is supposed, to the progressive deforestation of its upper reaches.

Owing to the heaviness of the tropical rainstorms, the loose structure of the volcanic soil, and the severe erosion to which the ground is subjected by the tropical climate, the rivers carry much solid material. The average silt content of the Solo river is 2.75 kg. per meter, or 2½ ounces per cubic foot. By way of comparison, we would mention that the Rhine's silt content is only ⅙ of an ounce per cubic foot.

Thanks to fertility of the soil and favorable climate conditions agriculture in Java has reached a very high standard. The vast majority of Javanese are agriculturalists. Owing to the great density of the population this means that, with a few exceptions, each cultivator works but a very small piece of land—often not more than an acre. The favorite crop of the Javanese is rice (*paddy*)—the staple food of the population. Rice may be cultivated in one of two ways—on dry fields or on *sawahs*, i.e., horizontal terraces bounded by little dikes (*galangans*) which make it possible to flood the fields or keep them flooded. The "dry" method is

*The last census was taken on January 1, 1930.



Movable weir in the Tjioedjoeng river, West Java; upstream view, length 142.50 meters

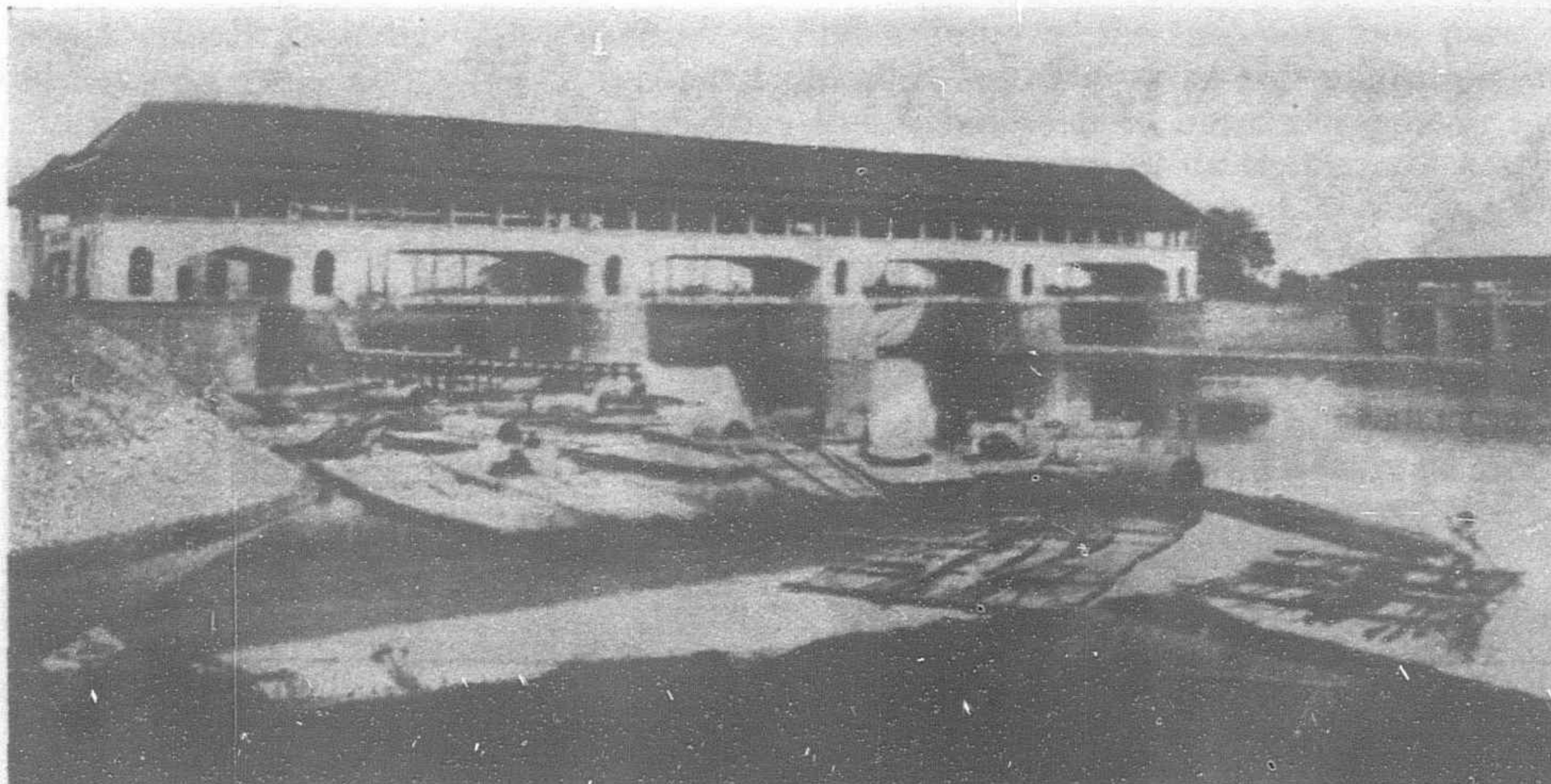
very little used in Java. Most varieties of rice do not lend themselves to this "dry" kind of cultivation, being semi-aquatic in origin, and, furthermore, the yield obtained from dry fields is usually much less than that afforded by *sawahs*. There is, comparatively speaking, more of this "dry" rice cultivation in the Outer Provinces. There a clearing is made in the woods to grow rice on and when, after a few years, the yield derived therefrom becomes insufficient, the plot is abandoned and the cultivator clears a new one. This is known as shifting cultivation of a kind which, generally speaking, is harmful to the area involved from the point of view of soil conservancy.

Sawah cultivation is of two kinds: irrigated and non-irrigated. In the case of non-irrigated fields the yield is entirely dependent on rainfall. And although in Java—and for that matter, generally speaking, in the Outer Provinces too—rainfall, is plentiful the *distribution* of the rainfall is often not such as to promote the well-being of the rice crop. This is particularly so in the plains. During the wet season, which is the normal season for growing rice, dry periods lasting several days often occur. If no rain falls for twelve days, this intermission in the water supply may be sufficient to ruin the crop on non-irrigated fields, and dry periods during the West monsoon lasting even more than twelve days are not a rare occurrence.

Hence irrigation is of prime importance for rice culture on *sawahs*, not only because irrigation makes the cultivator independent of the fluctuations of rainfall, but equally on account of the considerable quantities of manure deposited by the river-water owing to its high silt content. Furthermore, the growth is greatly promoted by the substances held in solution in this kind of water.

Irrigation must have been practised in Java from time immemorial. The oldest remnants of irrigation systems are traceable to the time of the Hindus who, according to inscriptions found on Hindu monuments in Java, came from India in one of the early centuries of our era and conquered the island. There are, however, philological grounds to assume that irrigation was known before the invasion of the Hindus. Of yore *sawahs* were laid out over a considerable area: they are made both in the plains and on mountain slopes, where they extend to as great an altitude as is consistent with successful culture (approximately 1,200 meters or 4,000 feet above sea-level).

Where there is enough water available for irrigation, rice is cultivated also during the East monsoon. This is mainly the



Movable weir in the Tjitaroem river, West Java, with a bridge; upstream view, length 108 meters. On the right, the inlet sluice, on left a lock

case in mountainous regions, but does occur in the plains here and there as well. If the water supply is not adequate, then the Javanese cultivator turns to crops like maize and cassava, which need less water, and grows these on his lighter soil, letting the heavier ground lie fallow for the time being.

Turning to native irrigation works, one cannot but admire the natives for what they have accomplished in the way of irrigation with the inadequate means at their disposal and respect them for the ingenuity and industry their achievements represent. The serious imperfections which characterize native irrigation works and make rice culture uncertain, particularly in the plains, can assuredly not be charged to the account of those who constructed them. The most important of these faults are the following.

A weir made of native material (stone, tree-trunks, bamboo, etc.) is generally not strong enough to withstand the violence of great banjirs, with the result that such a construction is often damaged, if not entirely destroyed. In the latter case making a new dam during that same West monsoon is not infrequently quite impossible and, hence, the work of irrigating the fields is impeded for the remainder of the season. Furthermore, the distributing canal into which the water is drawn off at the dam has an open inlet, which means that during a flood a great volume of water forces its way in, thereby often damaging the canal or even sometimes causing a break, and thus impeding the work of irrigation. Thirdly, if the distributing canal has to be taken across a water-course of some proportions, the native is not able to accomplish this artificially: instead he is obliged to draw the water discharged into his canals by means of dams, which, again, may lead to damage of the canal during heavy rainfall and hence impede irrigation.

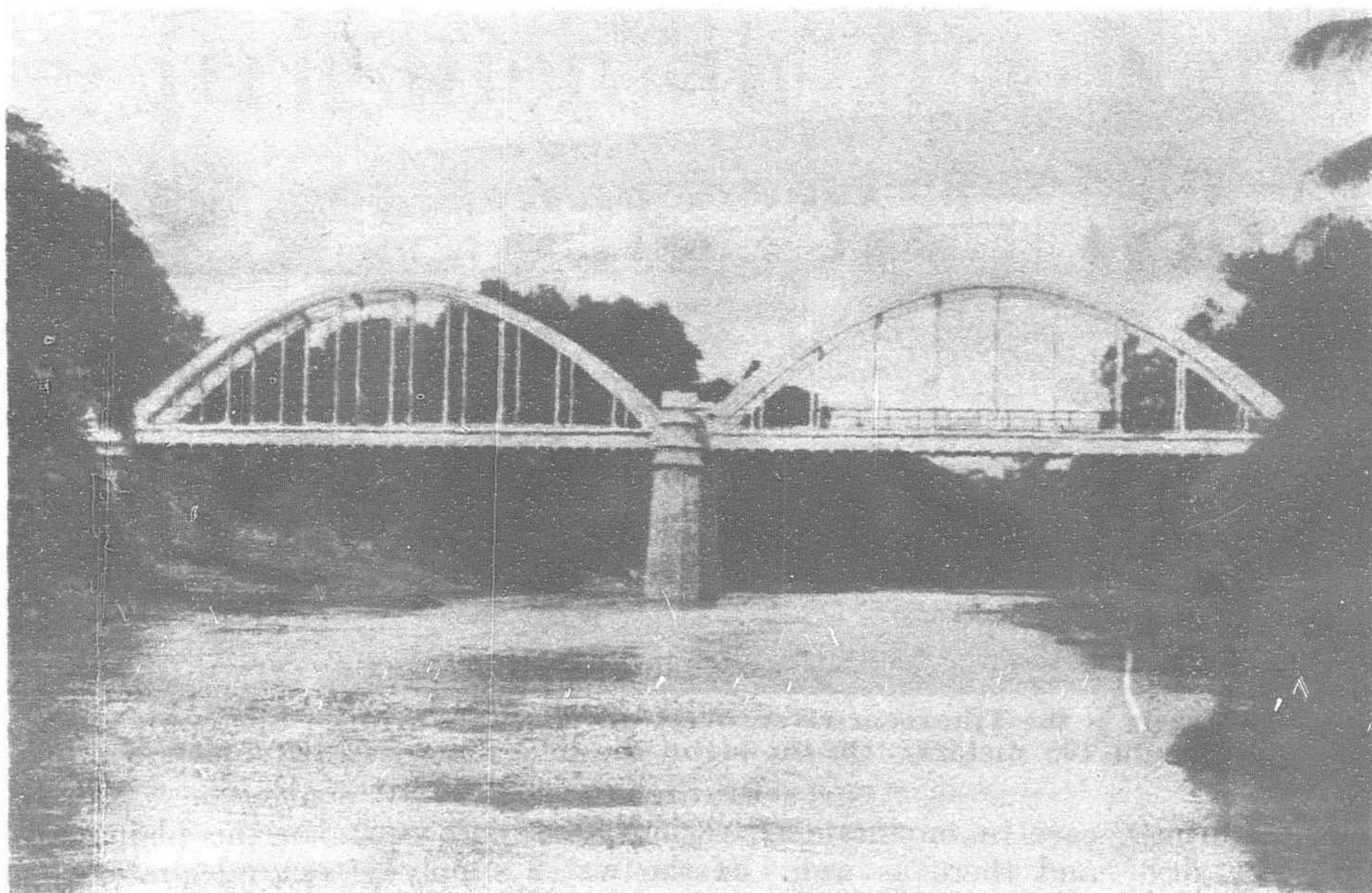
And finally there is the problem of drainage. By means of a number of dams water drained off from the *sawahs* is tapped from the drains through which it is being discharged and made to serve again to irrigate other fields. But such dams prevent the waste water being properly drawn off, with the result that—particularly in the plains—the heavy soil is inadequately drained and hence the crop is unfavorably affected.

Owing to these drawbacks the great native irrigation systems have gradually degenerated. The upkeep thereof became too burdensome, if not impossible, to carry. Crop failures increased and the welfare level of the people decreased. A point had been reached, where only modern technique could render effective assistance.

The first western irrigation work of any significance was done about the middle of last century. This was in connection with improving irrigation in the area known as the Sidhoardjo delta of the Brantas river, with a view to which the great movable Lengkong weir with ship-shutters as adjustable damming apparatus and an inlet-sluice for the irrigation of 34,000 hectares of sawah (84,000 acres) were built. At that time the native



Second tunnel in the main canal [of the Bandar-Tjahjana irrigation system (Serajoe irrigation district)], before the entrance a spillway and a cleaning sluice



Aqueduct in a secondary canal of the Sengkarak irrigation system (irrigation district Pamah-Tjomal). The two spans measure 30 meters each

works for distributing the water over this area were still retained. It was not until the present century, that these were improved along technological lines and the drainage system within the delta scientifically improved and finished.

Not until the eighties was the construction of a complete irrigation system based on technological principles undertaken. We refer to the Demak Waterworks, which supply with a completely equipped irrigation and drainage system an area of 33,800 hectares (83,400 acres), where famines resulting from crop-failure were wont to harass the population.

In a scientifically conceived irrigation system the dam is so constructed as to be proof against the violent action of *banjirs*. The water is led through a masonry inlet-sluice with adjustable openings to the main canal, which means that the water supply can be regulated to a nicety. From the main canal secondary canals leading across ridges branch off, and these carry the water to tertiary canals from which it flows to the tertiary or terminal squares and thence to the sawahs. Some tertiary canals tap the water directly from the main canal. At every point where the water passes from one canal into another, reliable distribution sluices with adjustable doors are constructed. In or behind these sluices is a gauge. Hence the distribution of the available water can also be regulated with a view to its being put to the most profitable use.

An irrigation canal crosses another water-course by means of an aqueduct, culvert or syphon of permanent construction, while overcharge of the canal caused by water flowing off the banks and hillsides is avoided by timely draining off over spillways.

In the valleys discharge canals are dug (except where there are natural run-offs) which unite at the point where the concavities meet. Existing drainage run-offs are improved whenever feasible, so that all the surplus water may flow down into the rivers or the sea without causing damage anywhere. In a scientifically constructed irrigation system, too, drainage water is used for irrigation again in so far as necessary and feasible, but whenever this is done care is taken that the drainage of the fields is not impeded.

If necessary, the rivers are diked and regulated: in some cases it has proved necessary to dig an entirely new and shorter passage to the sea. These river works are called flood protective works.

Natural cataclysms apart, no dislocation of the irrigation program need be feared where there are scientifically constructed waterworks, and reliable drainage is also assured in such cases.

While the Demak Waterworks were under construction in 1889 a separate irrigation,

drainage and flood-protection service was instituted as a division of what was then the Department of Civil Public Works (since become the Department of Traffic and Waterworks). This service was to be regarded as a successor to the "Irrigation Brigade" established in 1885.

Since then there has been steady progress in the field of native irrigation works improvement, or the construction of new irrigation systems.

What funds were spent annually on this work is shown in the accompanying graph. The sums there recorded refer to the total cost of surveying the territory, drawing the plans and carrying them into effect, but do not include the salaries of officials in regular Government Service. The upper line represents the totals for the whole of the Indies, the bottom line, those for the Outer Provinces. The latter plainly indicates, that until 1910 all work done in the field of irrigation—at least by the government Irrigation Service—was concentrated in Java and Madoera.

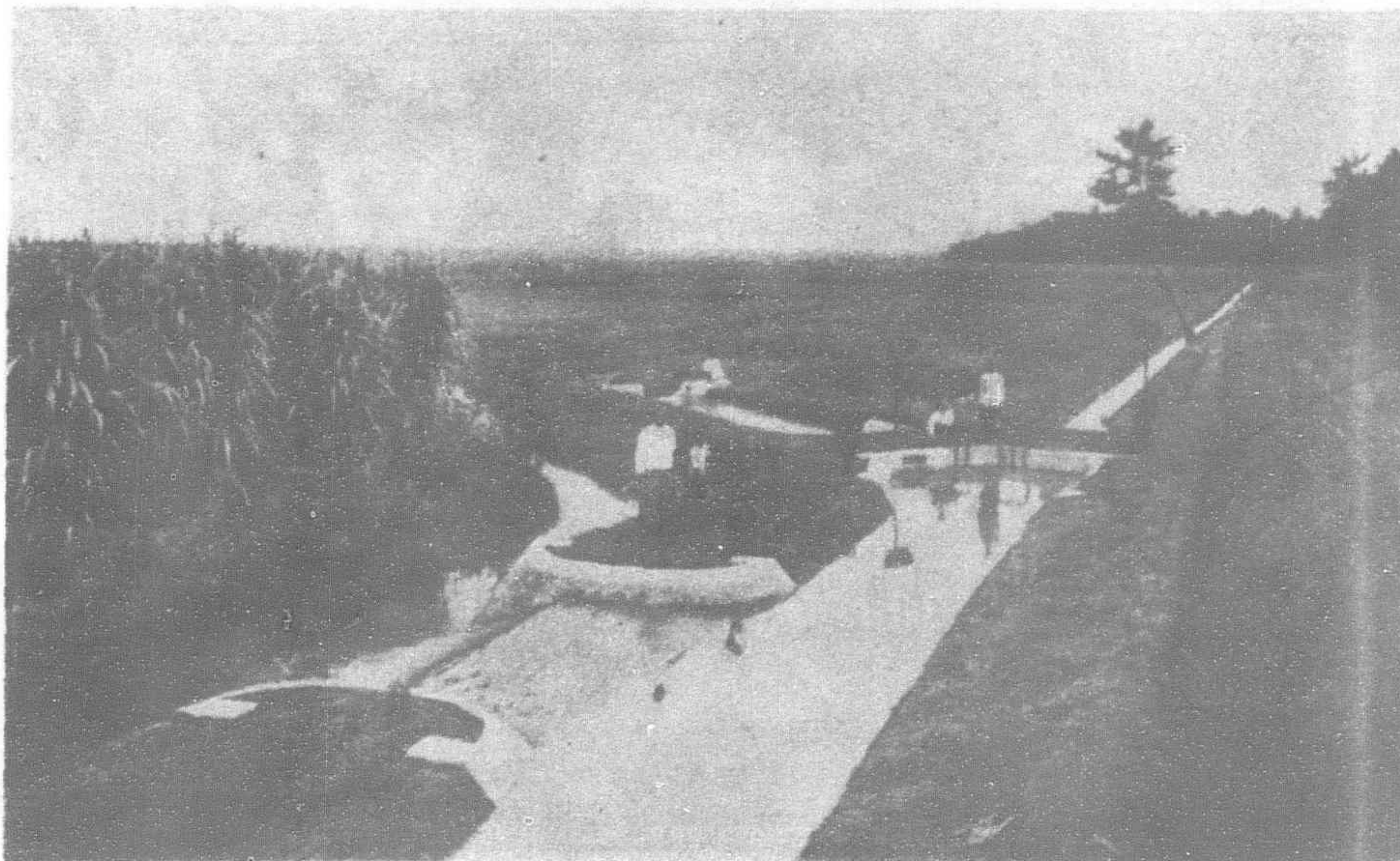
The graph further shows, that until 1910 the annual expenditure remained fairly stationary, to rise rapidly after that date, until it reached the peak in 1921 (with a slight drop during 1914-1916 owing to the world war). In 1921 the first crisis

necessitated limiting expenditure on irrigation works—a step, which did not come into effect, however, until 1922. After 1923 there was another gradual rise culminating in 1931—after which came the great world crisis, which brought about a terrific collapse—and reaching, in 1934, an exceedingly low minimum figure. In estimating the significance of the collapse one must not forget, that the price of materials and wages had also fallen and had, in 1934, dropped to about half the 1930 level: and, furthermore, that during the years of the depression the irrigation works had necessarily been more or less simplified, while more material of a less costly kind, such as wood, was employed. Thus the graph presents the relation between the work actually accomplished during the years of the depression and the previous years in an unfavorable light.

The continual increase of the population of the Netherlands Indies and the consequently steadily increasing need for food crops make it imperative that activity in the field of irrigation should be unremitting. Some idea of this marked increase may be obtained from the following table.

Year	Java and Madoera	Outer Provinces	Neth. Indies
1905	30,360,667	7,710,115	38,070,782
1920	34,984,171	14,366,663	49,350,834
1930	41,719,524	19,011,501	60,731,025
1940	48 million	22 million	70 million

(The figures for 1940 are estimated)



Terminal distribution sluice of a secondary canal. Before the sluice a spillway. In one of the two tertiary canals a gauge

The improvement of native irrigation systems along technological lines will often increase production to a marked degree. As an example of this we may quote the fact that before scientific irrigation and drainage works had been constructed in a certain irrigation district in West Java a successful rice crop produced a yield of 1,400 kg per hectare or 1,240 lb. per acre, while every four or five years the crop failed completely. On the other hand, very soon after the works had been established, the yield became 3,090 kg per hectare, or 2,760 lb. per acre, and the reason to fear crop failure had ceased to exist.

In Java irrigation can only be extended by the application of scientific methods, for wherever irrigation water can be obtained by native methods the Javanese have constructed systems already.

By the end of 1938 the Government had spent on the construction of irrigation, drainage and flood protective works a round total of 245 million guilders, 42 million of which had been disbursed before 1900. These figures do not include the sums expended on the repair and upkeep of works already in existence, or on the salaries of men in regular government employ.

The sum expended in Java and Madoera jointly before the end of 1938 was around 228 million guilders. We must mention here that the scientific works constructed in the Principalities of Soerakarta and Djoejakarta were not a charge on the general exchequer, and that, accordingly, the disbursements made on their account are not included in the above-mentioned sum.

At the end of 1938, the scientifically irrigated sawahs in Java and Madoera, excluding those in the Principalities, covered approximately 1,204,000 hectares or 2,975,000 acres, thus making the average cost per hectare and per acre 190 and 77 guilders respectively. The actual cost varies a good deal, however, for different irrigation districts, owing to many changing circumstances, such as wages and prices of materials during the execution of the works, differences in physical features, size of the terminal squares, etc.

By the end of 1938 a good 17 million guilders had been spent on irrigation, drainage and flood protective works in the Outer Provinces.

The curve representing the sums annually expended on the Outer Provinces shows, that costs gradually increased from 1910 to 1921 and then decreased until 1925. Up to that time only works for the benefit of the local population had been undertaken; these works are situated in the great islands of Sumatra, Borneo and Celebes and the smaller of Bali and Lombok.

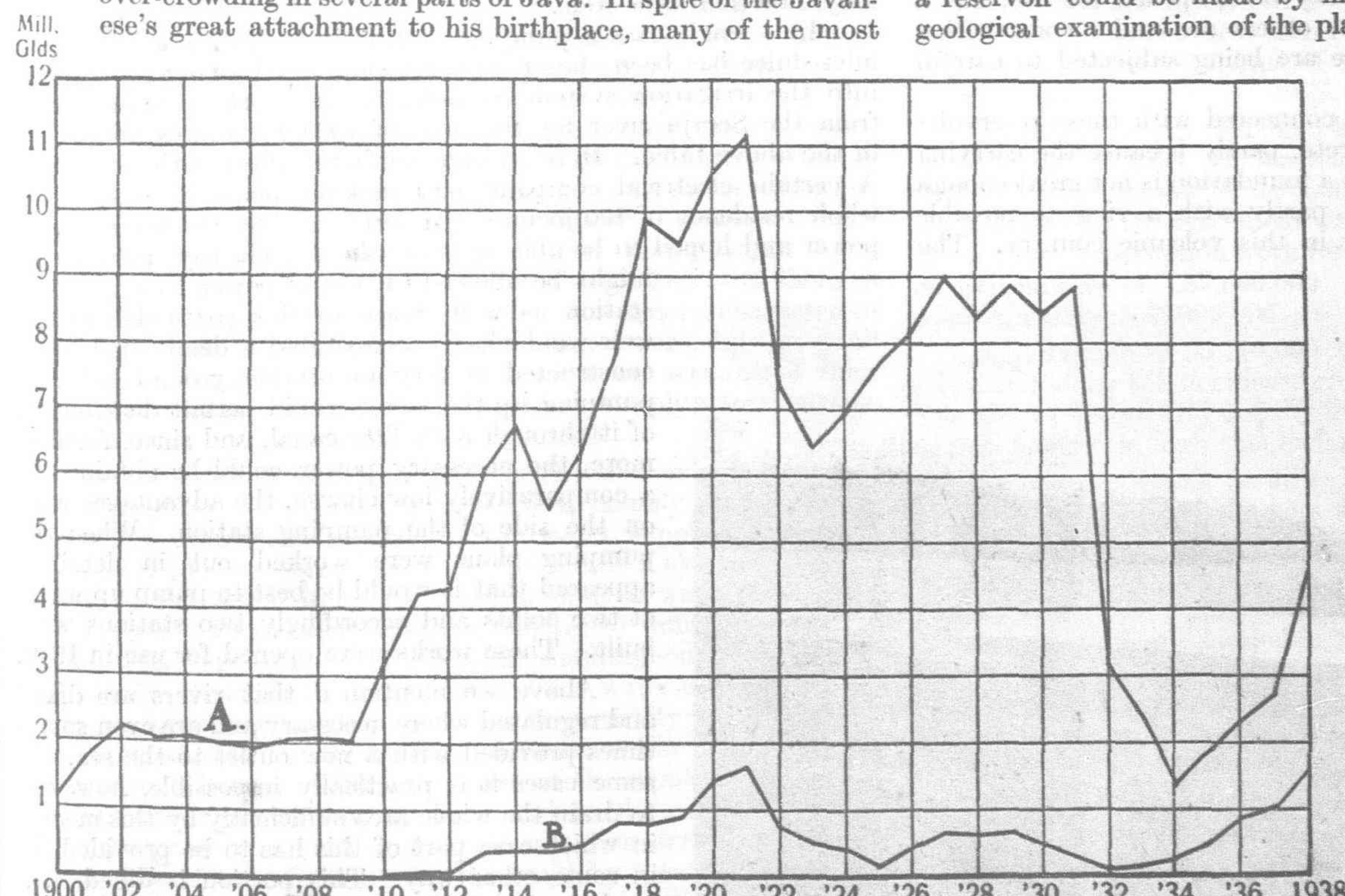
Meanwhile the gradual increase of the population had led to over-crowding in several parts of Java. In spite of the Javanese's great attachment to his birthplace, many of the most

indigent endeavored to find a living in the less populous parts of Java. The Government did all it could to assist this migration and in view of the fact that the Javanese is a born rice grower and will move only to places where there are fields that are or can be irrigated, encouraged the construction of irrigation works in those regions. But in Java the possibilities for extending irrigation are becoming fewer and fewer, so that, obviously, development along this line will not solve the population problem. In the Outer Provinces, however, a well-nigh unlimited number of Javanese could be provided with a livelihood as agriculturalists,—if only they could be provided with irrigated lands. Establishing Javanese colonies in the Outer Provinces would therefore mean construction of irrigation works. Accordingly, since 1925 until the present day, irrigation works have been, and are still being, constructed in Sumatra and Celebes in aid of the establishment of Javanese colonies on those islands. Meanwhile work is also being done to extend irrigation for the benefit of the local native peasants, with the result that in 1925 activities along this line in the Outer Provinces began to increase once more. The curve showing the annual expenditure reflects this fact, while also indicating the inhibiting effect of the great world depression.

In order to give the reader some idea of the proportions of some of the larger irrigation areas in the Indies, we present the following table.

Irrigation system	Island	Area	
		hectares	acres
Tjioedjoeng	Java	31,810	78,900
Tjisadane	"	40,500	99,800
Tjitaroem	"	70,300	173,500
Tjimanoek	"	92,500	227,900
Pemali	"	31,200	77,900
Serajoe	"	19,900	49,100
Sidhoardjo	"	34,000	84,100
Baroe	"	24,800	61,400
Way Sekampong (Colonization area)	Sumatra	42,600	105,200
Sadang	Celebes	63,900	157,800

We have already remarked that most rivers in Java are characterized by the fact that during the East monsoon they discharge very little water, while during the West monsoon they are subject to great floods. In this latter season vast quantities of water flow into the sea without having been put to any use—a fact which naturally gave rise to the idea of collecting this abundant surplus in large reservoirs and allowing it to flow back into the river beds during the dry season to compensate the general scarcity. Experts have long since discovered in the upper watersheds of different streams that feed irrigation works, gorges where a reservoir could be made by means of a short, high dam. But geological examination of the place where this dam would have to be built often revealed that the formation of the selected spot did not offer a reliable foundation for a high dam, with the result that only comparatively few possibilities for the construction of reservoirs actually remained. Even when a fit location for such a reservoir was found, it did not always prove feasible to make use of it. The expense involved in constructing a dam with all accessories is very great, and the market value of native dry season produce is very small. Hence, if only native crops are to be cultivated in the area concerned during the dry season, building a reservoir or *wadoek* as it is called in Java, cannot be regarded as financially justifiable. Expenditure for such a construction is only allowable from the standpoint of the Government if the step means that thereby help can, and therefore must, be afforded a distressed population.



Graph showing funds spent annually on irrigation work. Upper line represents totals for the whole of the Indies, the bottom line the totals for the outer provinces

If on the other hand, within the given area European sugar

estates are situated, as is the case in several of the extensive irrigation districts in Java, it is a different matter. The culture of sugar-cane cannot produce satisfactory financial results without irrigation during the dry season, and this for the following reasons. Native rights to ownership of land may not be transferred to Europeans, except in the case of small sites for building houses, a factory and the like. Hence the land on which the sugar-cane is grown has to be rented from the natives. And since the cane is planted at the beginning of a dry season and only harvested during the next dry season, the rented land cannot be utilized for growing a West monsoon rice crop. To further the production of rice, the Government has therefore found it necessary to limit the area devoted to the cultivation of sugar-cane even more stringently than the ordinary requirements of the rotation of crops would demand. The result is that sugar cultivators are obliged to carry on the culture very intensively if it is to be made to pay on the limited area in view of which necessity irrigation during the East monsoon is indispensable. And in regions where the East monsoon irrigation is very poor, cultivation of cane is still more limited or entirely prohibited with a view to making room for the dry-season crops grown by the population. It is therefore of prime importance to the sugar industry to help to compensate the East monsoon scarcity, and hence sugar estates are usually very willing to contribute substantially towards defraying the expense of constructing a reservoir and, in cases where a *wadoek* may put them in a position to increase their maximum output, they may even be prepared to bear all the costs. Hence, it is less difficult for the government to make up its mind to construct reservoirs in the so-called sugar areas than in others.

Yet the first two *wadoeks* built and opened for use in 1912 were not constructed for sugar areas, but for mitigating the distresses of regions where water was very scarce. They are not large (one and nine million cubic meters respectively) but recently a third of the same kind with a capacity of 40 million m³ was built, while the building of two more reservoirs of still larger size is being considered.

Several *wadoeks* have already been completed in sugar areas, the last of them, which has recently been opened for use, has a capacity of 60 million m³. Some others are under construction in such areas, and plans for more are being subjected to careful examination.

We may add that the dams connected with these reservoirs are not built of masonry or concrete, partly because the carrying power of the ground that serves as a foundation is not great enough to bear such a construction, and partly with a view to possible earthquakes, which are no rarity in this volcanic country. The



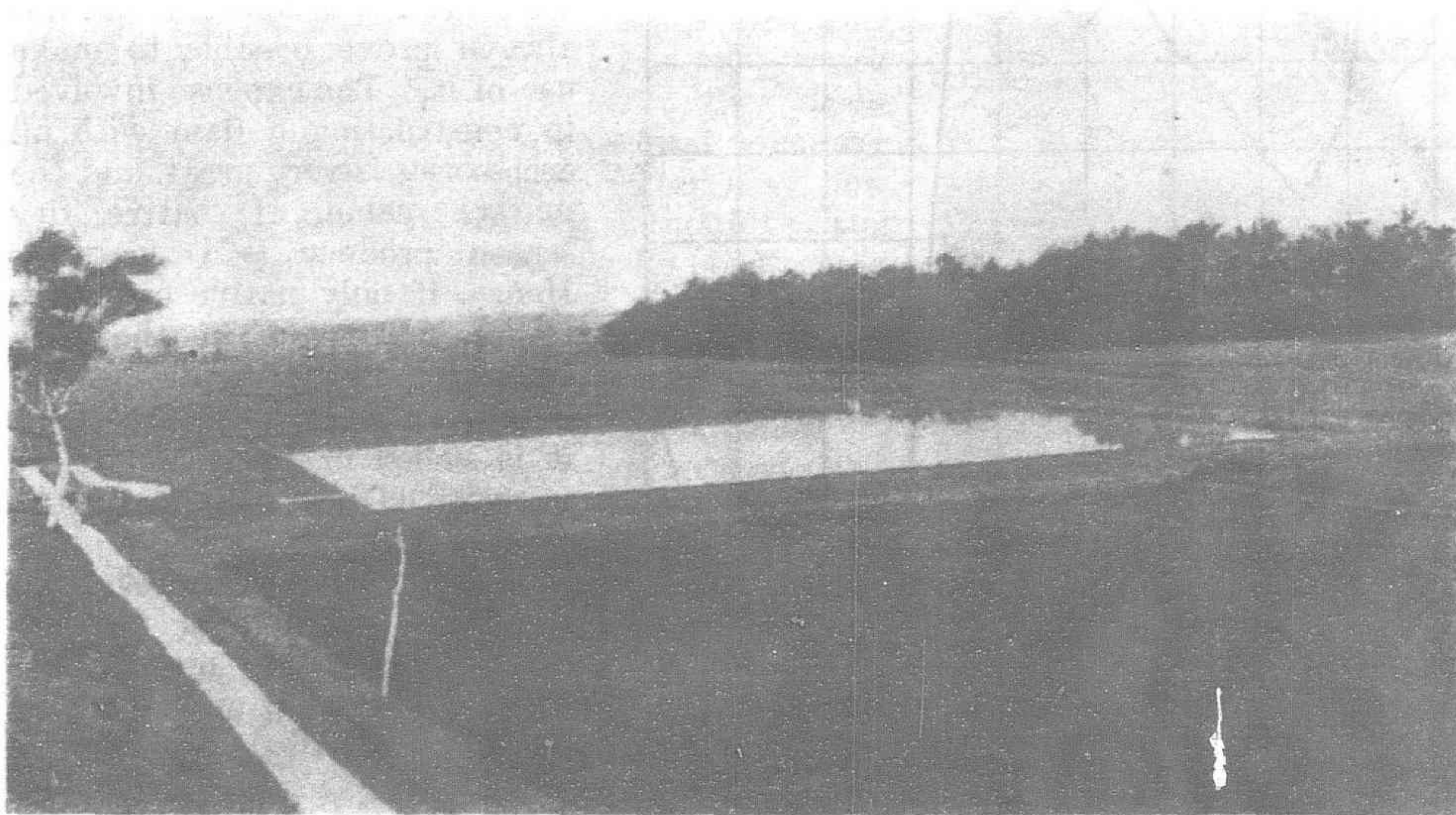
Bridge syphon on the main canal of the Bandjar-Tjahjana irrigation system (Serajoe irrigation district). The picture was taken while the tubes were being cleaned

dams are made of earth or stones (rockfill). These types of construction necessarily demand a broad base, so that the foundation need possess no very great carrying power.

In the Indies the water is as a rule drawn from the rivers by means of a weir which raises the level of the stream to the required height. If possible a permanent weir should be used, because this is cheaper to build as well as to exploit than a movable one. If, however, the level to be reached is so high as compared with that of the river that the use of a permanent weir would necessitate the river being diked for a considerable distance in order to prevent overflowing at the time of flood, it may prove less expensive to make a dam which is partly or entirely removable. Sometimes there is a natural sill in the river bed with a permanent hollow called *kedoeng* in Java just up stream, in which case the sill may function as a weir.

In a single case a pumping station instead of a weir with an inlet-sluice has been chosen as the means for drawing river water into the irrigation system, namely, in the works tapping water from the Seraju river for the area of 19,900 hectares mentioned in the above table. Here an unusual factor affected the situation. A certain electrical company was making plans to supply the whole residency of Banjoemas with electricity by the use of water power and hoped to be able to make the scheme pay, provided it might be allowed to supply power to a pumping station as well. Since in this particular case a weir would have necessitated a deep canal being constructed in very unsuitable ground, whereas pumping up the water would permit distribution of it through a shallow canal, and since, furthermore, the necessary power could be obtained at a comparatively low charge, the advantages were on the side of the pumping station. When the pumping plans were worked out in detail it appeared that it would be best to pump up water at two points and accordingly two stations were built. These works were opened for use in 1939.

Above we mentioned that rivers are diked and regulated where necessary and are even sometimes provided with a new outlet to the sea. In some cases it is practically impossible, however, to drain the whole area sufficiently by this means, in which case part of this has to be provided for in some other way. This portion is diked, i.e., made into a polder. The resulting enclosure can usually be drained through one or more outlet



Field reservoir (*veldwadoek*) for gathering water at night-time

sluices made in the surrounding dike: only in exceptional cases is it necessary in the Indies to use mills.

As an example of such a diked marsh we may cite the Watudakon polder situated along the Brantas river not far up-stream from the Sidhoardjo delta. It has a surface area of 7,100 hectares or 17,500 acres, and the waste is drained off through a syphon under the dike into a drainage canal which takes it down to a sufficiently low branch of the river Brantas.

In the above we outlined—very briefly—the main points regarding the irrigation works themselves. The accompanying photographs illustrate some of the aspects of the work described.

Quite as important as constructing such works is *running* them. This latter includes, besides the regular upkeep, repairs and improvements, *water-control*, i.e., distributing available water *to the very best advantage for all crops concerned*. Hence, proper water control, whether in connection with native or modern scientific irrigation, is of the greatest importance to agriculture. Accordingly the irrigation service has devoted careful attention to this aspect of the question from the very first, and control has been systematically and steadily improved. As a result, the whole subject has developed so many aspects that a more or less adequate account thereof would take us beyond the scope of this article.

In Java special exploitation services have been instituted which, as a rule have charge of an area including one or more extensive river-basins and the irrigation systems fed by the rivers in question. Such services are named after the large rivers in their care. The Serajoe Irrigation District was the first of these and was established in 1888. Then came the Brantas, Serang, Pekalen-Sampean, Pemali-Tjomal and Tjimanoeck Irrigation Districts in 1892, 1893, 1907, 1908 and 1910 respectively. Besides these a Madioen Irrigation Section was established in 1909. This section was intended to form part of the future Solo River Irrigation District which, owing to unforeseen circumstances, has never yet come into being. These services, which originally functioned under the Central Government, have since been transferred to the three autonomous provinces into which Java and Madoera have been divided—West Java (1926), Central Java (1930), East Java (1929) and are now incorporated in the several provincial departments of waterworks.

In a scientifically irrigated area possessing a complete set of adjustable distribution sluices, the distribution of water is most adequately controlled. In regions where the old native system obtains, control is much more difficult, especially in those where the amount of water available during the East monsoon and even occasionally during the West monsoon is inadequate. There technical water-control is even more imperative than in areas irrigated according to technological principles. Even in native-irrigated areas well supplied with water (as they generally are in mountainous regions) technical control is highly desirable. In such areas the point to be watched is that not more water is drawn off than is needed for the actual irrigation of the crops, so that as much as possible may be allowed to pass on to fill the needs of less abundantly supplied areas further down stream. Hence technical aids—mainly small inlet sluices, sometimes accompanied by a weir, and in any case by a gauge—are valuable here and there in the upper reaches, but apart from these the native character of the works may be retained. Though each serves only a small area, native irrigation systems of this kind, on account of their being so very numerous in Java and Madoera, supply a total surface of 1.5 million hectares or 3.7 million acres!

During the West monsoon there is virtually only one kind of crop which has to be taken into account, namely, rice. Nevertheless it is important to regulate the water supply carefully in this season too, in connection with the method by which rice is cultivated and the fluctuations in the amount of water discharged by the river. In the dry season a number of different crops requiring water are in need of attention simultaneously and hence particularly great demands are made on water-control. Nowadays an annual cultivation program is generally drawn up for areas with a small supply of East monsoon water. The agriculturalists only have a claim on a share of the available water for the cultivation of crops of the kind and to the extent provided for in the program. During the East monsoon arrangements are almost always made for watering the crops by rotation but sometimes these same regulations have to be applied during dry periods in the West monsoon as well. In areas including European sugar

estates the irrigation service has to take into account the fact that in the case of sugar-cane irrigation takes place by scooping the water out of ditches and pouring it on the plants, and that this work can only be done properly by daylight. This circumstance has led, in regions where water is scarce, to what is known as the "day and night regulation," according to which water was supplied to sugar estates during the day and put at the disposal of the native cultivators at night. This arrangement, although necessary to the well-being of sugar culture, was regarded as unfair, and accordingly the authorities tried to devise means by which to avoid it. The plan adopted was to construct field reservoirs. These are small catchments in which all the water conveyed thither during the night is allowed to accumulate and from which it is made to flow back into the distributing canals during the day. By this arrangement it becomes possible to supply all crops—whether by rotation or simultaneously—with water by daylight.

Water control measures are, of course, subject to general rules which are published in the "Water Regulations" and applicable either to a given irrigation district or to an administrative area. In 1936, by ordinance of the Governor General of the Netherlands Indies, an up-to-date "General Water Regulation" for the Government lands of Java and Madoera (hence not for the Principalities) was issued. This regulation contains general principles to be observed in connection with water supply, and to be used as a basis for provincial and district regulations.

In conclusion we may add in passing that in the Indies no water rate are charged. Expenditure on irrigation works is more or less off-set by an increase in receipts from land taxes due to improved results obtained by cultivators, and by more revenue from general taxes owing to enhanced general prosperity. To this subject we may return in an article devoted to the exploitation of irrigation works.

Tokyo to Have Harbor

THE Government has definitely decided to open Tokyo harbor to international trade, reports the *Miyako*.

Arrangements are under way to make it one of the largest fully equipped harbors in the Far East by 1944.

When the plan is realized, the paper says, the main waterway of the harbor will be six kilometers in length, 200 meters in width, and 7.6 meters in depth. In addition to this the breakwaters will be extended four kilometers and the number of bouys will be increased from the present 21 to 46. When this work is completed the harbor will accommodate at one time 80 vessels of less than 6,000 tons each. If the canal between Tokyo and Yokohama now being planned is completed, ships of more than 10,000 tons can easily enter the port.

The construction of Tokyo harbor, was first proposed in 1880, but the actual work of construction was not begun until 1906. The first three stages of the building plans were finished in 1931. That same year the agreement was renewed and arrangements made to continue construction work for another 14 years, with an estimated expenditure of Y37,600,000. So far Tokyo City has expended approximately Y65,000,000.

Approximately 35,110,000 square meters of land have been reclaimed along the northeastern margin of Tokyo Bay since 1910. The area of Tokyo City is daily increasing at the rate of about 2,310 square meters through this reclamation work.

Among the harbor facilities so far completed, there are quays and piers totaling 1,783 meters which is sufficient to accommodate at the same time 16 vessels of from 3,000 to 6,000 tons each. The 21 bouys now floating in the harbor are sufficient to moor 24 ships.

Cargoes annually landed in Tokyo harbor from Yokohama and other ports are estimated at some 12,300,000 tons with a value of about Y1,600,000,000. The port has at present contacts with various ports scattered throughout the country and also with many other ports within the Far Eastern Co-prosperity Sphere.

Tokyo harbor has already carried on a fair amount of international trade in spite of restrictions imposed because of not having as yet been formally opened as an international port. It has, in fact, been doing business of this kind valued at about Y200,000,000 annually.

The Sungari River

By HORACE M. MASUDA

(Eastern Asia)

THE Tigris, Euphrates, Nile, Ganges, Yangtze, and Yellow Rivers are some of the most prominent waterways that have nurtured great civilizations in the course of history. Though rivers have played havoc with human life and progress at times man has refused to submit to their ravages and has built up his life and civilization on their banks.

As in other lands, the Sungari is the mother of North Manchuria, a land rich in natural resources, with space and possibilities of great development. Peoples have come and gone and their civilizations with them on the waters of this great stream, but the Sungari still flows through the vast plains of Manchuria accommodating 90 per cent of all river traffic in the country.

Lake Paishan in the Changpai Mountains, extending along the border of Manchuria and Chosen, constitutes the source of the extensive Sungari system. Meeting the Erhtaokou, the main branch of the Sungari takes an irregular course through the ravines of the Changpai Mountains, proceeds in a northwesterly direction, gathers in a number of minor streams, passes the ancient scenic city of Kirin, and continues toward the north-west through the flat plains of North Manchuria. The Itungho joins the Sungari at a point east of Hsinking and a little north of Fuyu, the Nunkiang is assimilated. Then the great stream banks sharply to the right and runs north-east forming the boundary between Kirin and Pinkiang Provinces for some distance until it meets the Lalinho. Flowing past Harbin, it keeps its course ever to the north-east and gathers in all the minor streams in North Manchuria on its long sea-bound journey. Taking in its last tributary, the Mutankiang at Ilan, it empties into and becomes itself a tributary of the mightier Heilungkiang, or Amur, near Tungkiang, together with the Ussuri River.

The total length of this great waterway is no less than 1,927 kilometers and the whole system, including the main stream and the network of tributaries, irrigates rich agricultural, timber, and mining regions, a vast area of 520,000 square kilometers. Twenty-six *hsien*, or counties, of Manchoukuo play host to this huge silver serpent as it winds its way toward the sea, while cities and towns like Kirin, Wukoshu, Hsincheng, Fuyu, Chaochou, Harbin, Hulan, Ilan, Fuchin, Tungkiang and others, all of which are the centers of agricultural development and industrial activities in their respective regions in North Manchuria stand on the banks of the Sungari.

The major tributaries of the Sungari are the Nunkiang, Lalinho, Ashihho, Hulanho, and Mutankiang. Each tributary in turn is a lesser waterway for small river craft or for the log rafts which float downstream to assembling points. It is no wonder then that the Sungari is regarded as the mother of North Manchuria.

Navigation possibilities of the Sungari were first studied by Count Mamursky Muravieff, Russian Far Eastern Governor, who in July, 1857, after signing the Treaty of Aigun with China, sailed

upstream on the Sungari from Tungkiang to a point 21 kilometers in a river boat called the *Amur*, and from there proceeded to Sanchsing, now Ilan, in a smaller craft. After various attempts to inaugurate a system of navigation along modern lines, the Russians in 1897 succeeded in transferring river boats from the Amur River to the Sungari. On the pretext of protecting her rights and interests in North Manchuria, Russia dispatched troops into this region and occupied the whole area in 1900 when the Boxer Rebellion broke out. As a result, navigation rights on the Sungari River were completely vested in the hands of the Russians. It was not until 1908, however, that passenger and freight services were actually opened. Since then considerable progress was seen and the volume of traffic was on the increase but dangerous and often chaotic conditions in Manchuria prior to the Manchurian Incident

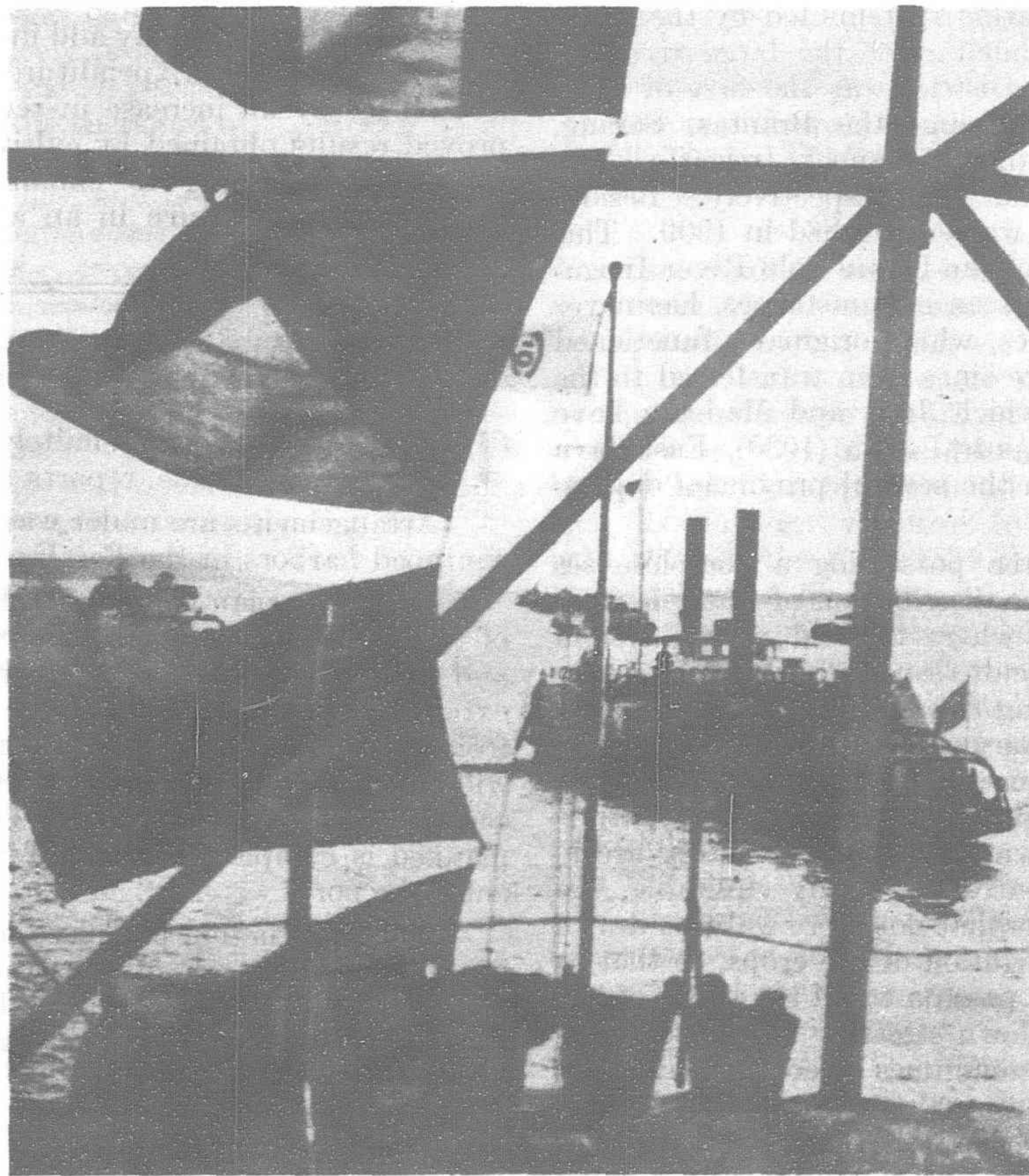
not only hampered further development but in many cases even prevented the operation of ships on the Sungari. Then came the Manchurian Incident and everything was at a standstill for a time.

The Japanese forces immediately pacified the region along this waterway and with the rise of Manchoukuo, the Provisional Sungari River Navigation Committee was formed for the main purpose of re-opening the abandoned service. This committee was dissolved in July, 1932, and the Manchoukuo Government entrusted the management of navigation on the Sungari to the South Manchuria Railway Company together with the management of all state railways and ports and harbors under the jurisdiction of the new government.

To undertake this new work, the South Manchuria Railway established the General Directorate of Railways at Mukden and charged this huge organ with the management, operation and supervision of state railways, ports and harbors and navigation on inland waterways in North Manchuria.

In view of difficulty in co-ordinating the services of various private shipowners, the General Directorate of Railways decided to form a syndicate participated in by official and civilian interests, and as a result, the Harbin River Navigation Federation Bureau was established at Harbin in 1932. In March, 1939, all private shipping firms were purchased and incorporated into a unified river transportation system under the South Manchuria Railway, while in April the North Manchuria River Navigation Bureau, an organ directly under the General Directorate of Railways, was established at Harbin. Thus, a unified rail and river transportation system was perfected.

To-day steamboats ply between Harbin and Kiangchiao (598 kilometers), Sanchakou and Kirin (458 kilometers), and Harbin and the junction of the Sungari and the Heilungkiang (Amur) Rivers (at Lahasusu, 696 kilometers) a total distance of 1,662 kilometers. Moreover, sailing vessels and smaller river craft travel a greater distance of the tributaries than steam-propelled craft.



River craft on the Sungari

A ride down the Sungari from Harbin to Chiamussu, a young modern city still in the making in northeastern Manchuria, is recommended to travellers who care to see what this great waterway is like. Large comfortable steamboats, strikingly similar to those that operated on the famous Mississippi and other rivers in the southern states of America, are available, sailing daily from Harbin or Chiamussu.

The city of Harbin, the starting point on this downstream journey, is the metropolis and dynamic center of North Manchuria and owes its existence primarily to the Sungari River. The Little Moscow of the Far East is supplied with water from the Sungari (far upstream). In summer its cosmopolitan residents enjoy yachting, swimming, angling, motor boating and other water sports and in winter ice sledding or skating on the frozen river surface which becomes so thick that horse-drawn carts of two to four-head laden with soya beans or other bulky commodities can cross with ease. In Manchuria, Sungari is practically the synonym for Harbin. But this is just the beginning for the real pleasure is found in the downstream journey to Chiamussu.

One's ticket is punched at the Fuchiatien quay at Harbin just as though boarding a train. Up the gangplank on board the ship, and a smiling boy-san (really a young girl) ushers one to his stateroom.

A sharp blast signifies ten o'clock sharp. The clear morning air of Harbin resounds with the departure whistle of the steamboat which is sent off by the lonely tune of Auld Lang Syne played on the amplifier on the quay. This is an "express ship," because it stops at only certain important points.

Soon the engines begin to pick up speed and the huge propelling wheels on each side of the boat churn the water to a silvery froth. Far in the hazy distance looms Harbin, the bulbous towers of Russian churches sparkling like golden balls in the air.

The massive steel bridge across the Sungari at Harbin shrinks in size and finally disappears as the boat rounds a bend. A feeling of being alone now comes over everyone just as when a ship leaves land on a cross-ocean voyage, for the company and the security which a large modern city provides are now gone, and an endless stretch of velvety green is all that one can see. Here, one would certainly think that the earth is flat for clear across to the horizon only grassland greets one's vision. No sign of animal life, no human habitation, no matter which way one turns, just a level sea of green with only the broad Sungari flowing through it like a silver ribbon. It is like going out on an expedition into the wilderness.

Travellers abandon the rail and go up and over to the navigating bridge where "no passengers are allowed," but once in a while an inquisitive traveller is politely received. The whiskered captain and first mate, both Russians, greet them with friendly smiles. It is strange that all captains and sailors have a salty air about them even on the steamboats that ply on the rivers in the interior of Manchuria hundreds of miles from the sea. The skipper spoke understandable English and willingly offered his services in satisfying the traveller's curiosity.

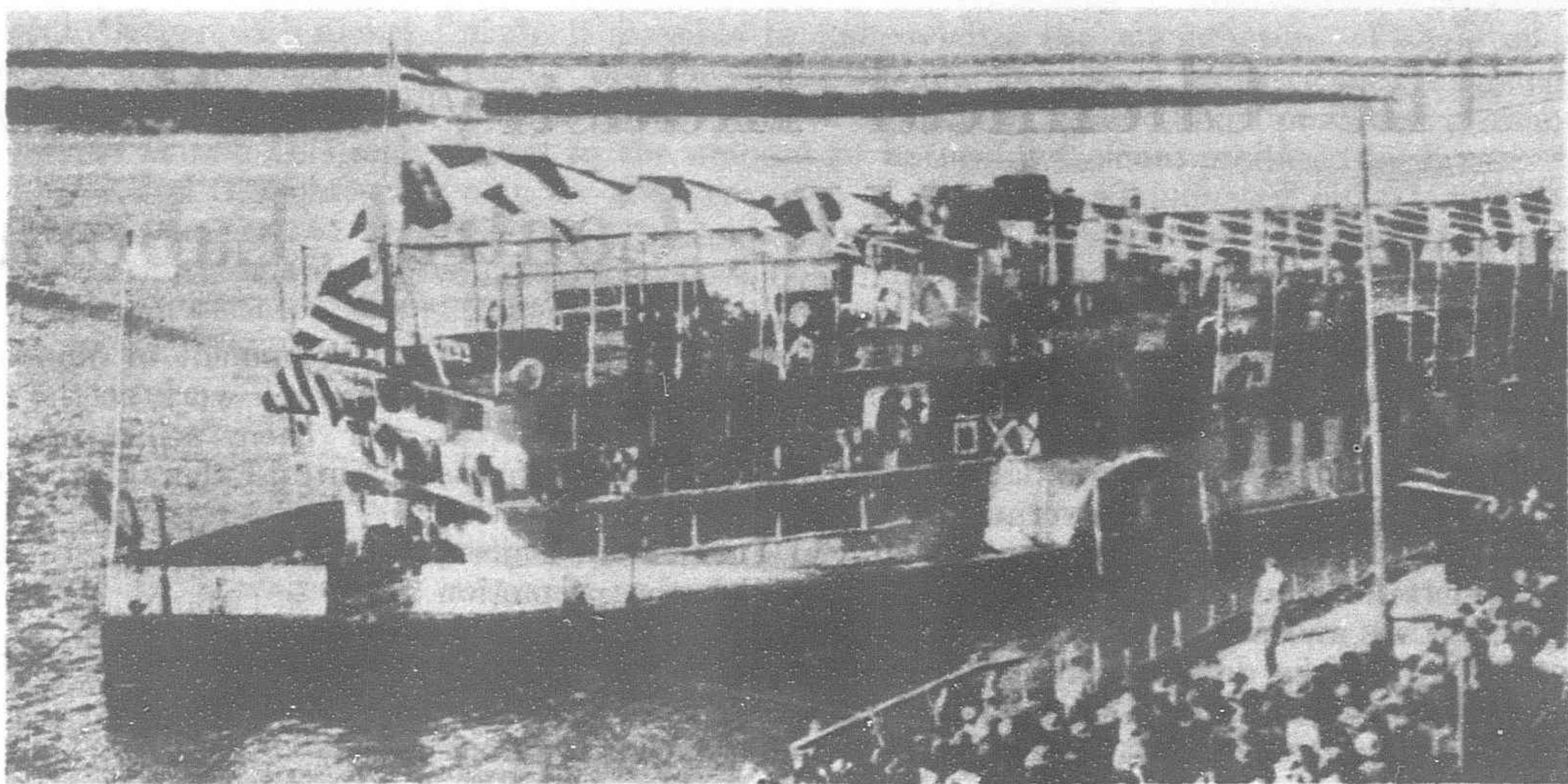
"How large is your ship and how fast does it run?"

"Oh, from seven to eight hundred tons. We make good speed downstream, say, from six to nine miles an hour."

"Been on the river long?"

"Oh, a very long time."

To be the captain of a Sungari river boat is no easy task. Each turn, each current has to be met skilfully and the ship must be guided constantly from one bank to the other to avoid sand bars and to seek the deepest channel. The flow of the Sungari is very rapid though the velocity of the surface water to a depth of three or four feet is very low. The undertow below that is so fast that should one fall overboard his chances of coming up are very slim. Not long ago, a Russian businessman who had gone out for a week-end fishing trip a few miles upstream from Harbin, fell into the seemingly idle water but his body did not appear until an hour later when it was caught in a net stretched out near the railway bridge.



A Sungari River showboat, the so-called "I-an-Sen," a distinctive feature on this great Manchurian steam

Many varieties of fresh water fish call the Sungari home. The most delicious fish used in tasty Chinese dinners such as the carp, crucian, salmon-trout, etc., are caught in this stream. As the boat glides over the smooth water one sees crude fishing shacks which the natives use during the season, or groups of fishermen in flotillas surrounding schools of fish with drag nets. In winter when the water is frozen to a considerable depth, these native fishermen simply break a hole in the ice, scoop up the hibernating fish with strange looking nets and fling the finny captives on to the river ice. The startled fish continue to flap desperately on the cold ice, but within five or ten minutes they move no more for the bitterly cold air freezes them stiff. There is no better nor cheaper way of immediate refrigeration and the finny catch is scooped up with spades and packed in gunny sacks for shipment to distant markets. It is said that the taste and nutrient value of the fish are perfectly preserved because they are frozen immediately.

A piercing sound from the whistle and the stopping of the engine indicate that something is about to happen. Out stick many inquiring heads from portholes to see what it is all about. The boat has reached Mulan, the first "port of call" after nine hours from Harbin. The boat simply turns its nose upstream and parks itself along the mud bank. A plank is lowered and people begin to disembark or embark. Mail bags are exchanged. Like all places of call on this river course, Mulan is a small town of about a thousand clustered houses, decidedly native in style, some built of stone or bricks but the majority of mud. Anyone who has nothing to occupy his time comes rushing down to the "dock" just for curiosity's sake. Manchurian wives squat on the ground with their offspring running rings about them. Passersby stop to lean on the fence and shoot a fascinated look at the "river train." The town police, all Manchurians, clad in smart uniforms with sabres dangling at their side inspect all incomers and their baggage lest undesirable elements penetrate the peaceful villages. It is surprising that wherever one travels, no matter how deep into the interior, he finds Manchoukuo police officers dressed in the established uniform checking up on new arrivals or performing other routine duties for the preservation of peace and order.

Soon the boat sails again but it is already time for dinner. The boat's dinner is served in the same way as on a train, and the girl boy-sans serve the meals. There are two dishes, Japanese and Chinese, all *table d'hôte*. A simple Western meal is also available and one pays for all meals in addition to the boat ticket.

Night falls on the tiny steamboat on the lonely Sungari and with the rise of a moon as beautiful and romantic as any in Hawaii, the boat sails on a sparkling sea of gems. Far in the distance mountain ranges begin to appear. They look like distant islands on a broad endless ocean, but it is time for bed.

Two more short midnight stops, and the boat reaches Ilan at five in the morning. It was here, at Ilan, that the Japanese immigrant farmers from Chifuri and Iyasaka near Chiamussu greeted the first battalion of brides who had come down this same Sungari from Japan via Dairen and Harbin. On this particular trip there happened to be no brides so the boat moved on again without any excitement.

(Continued on page 69)

The Chemical Industry in Manchuria and the S.M.R. Central Laboratory

THE Central Laboratory had its inception in an organization established under a decree of the Government-General of the Kwantung Leased Territory in October, 1907, at the instance of Baron (later Count) Shimpei Goto, who was supreme adviser to the Government-General. The organization started operation in a government building at Fushimidai, Dairen, to undertake laboratory work in connection with the promotion of industries and sanitary facilities, which were deemed absolutely necessary for the development of Japanese people in Manchuria. As it grew steadily larger, the Central Laboratory was later transferred to the management of the South Manchuria Railway Company to enable further expansion. The S.M.R. Company thus took charge of the Central Laboratory, including its organization, equipment and staff. The Central Laboratory under S.M.R. management recorded a further development, with its activities becoming ramified and diversified. In 1918, its offices were removed to the present building, and since then the Central Laboratory has witnessed various changes in its organization concomitant with the changes in the organization of the South Manchuria Railway Company itself. Its sanitary and hygienic laboratory work has been transferred to the Sanitary Laboratory, and it was merged with the Railway Laboratory of the S.M.R. Company for a time. But nonetheless the Central Laboratory has gone on expanding year after year and its activities have continued on an ever-widening scale.

The Central Laboratory belongs to the Research Department of the South Manchuria Railway Company, presided over by Dr. Tsuneya Marusawa, adviser to the S.M.R. Company. Its organization and budget are as follows:—

Organization:

Secretariat Office: General affairs, Accounts, Filing and Machinery.

Inorganic Chemistry Division: The Electric Chemistry Laboratory, the Ceramic Laboratory, the General Inorganic Chemistry Laboratory and the Inorganic Chemistry Analysis Laboratory.

Metallurgical Division: The Metallurgical Laboratory and the Mineral Separation Laboratory.

Organic Chemistry Division: The Fats and Oils Laboratory, the Soya Bean Laboratory, the Fibre Laboratory and the General Organic Chemistry Laboratory.

Fuel Chemistry Division: The Coal Laboratory, the Mineral Oils Laboratory, the Synthetic Fuel Laboratory and the Gas Laboratory.

Agricultural Chemistry Division: The Food Fermentation Laboratory, the General Agricultural Products Laboratory and the Hides and Leather Laboratory.

Extraordinary Laboratory.

Physics Laboratory.

Laboratory for Public Use.

The staff of the Central Laboratory is 426 in number, including.

141	senior regular staff members.
6	non-regular staff members.
51	junior regular employees.
188	general employees (Japanese).
40	„ (Manchurian).

Budget.—The budget of the Central Laboratory is about Y.300,000 including overhead charges and working expenses.

The Central Laboratory occupies a site, covering an area of 33,861 square meters, with its buildings covering an area of 16,511 square meters.

Chemical Industry in Manchuria

True to the purpose of its founders, the S.M.R. Central Laboratory has made substantial contributions to the industrial

development of Manchuria, by conducting physical and chemical research work on the natural resources of Manchuria and methods for their utilization. Historically surveyed, the work of the Central Laboratory may be divided into the following three periods:

The First Period (from the Meiji to early in the Taisho Era)—A period of research work on natural resources in Manchuria.

The Second Period (from early in the Taisho Era to the end of the Taisho Era)—A period of industrial initiation.

The Third Period (from the end of the Taisho Era up to the present)—A period of original industrial activity.

The first period of research work on the natural resources in Manchuria was ushered in by the Russo-Japanese war (1904-5), which imparted a powerful stimulus to the advance of the Japanese people into Manchuria and Mongolia. The Central Laboratory was entrusted with the task of undertaking laboratory work on natural resources and hygienic and sanitary affairs in Manchuria with a view to preparing the ground for organizing mining and other industries in that country in a small way.

The situation in Manchuria at the time was such that even a short trip outside the railway zone between Hsinking, which was called Changchun, and Dairen, was attended with great difficulty. Exploration of the hinterland was out of the question, because it spelt certain death. In its initial stage, the technical equipment of the Central Laboratory was poor and efficient laboratory work was thus rendered extremely difficult, but nonetheless the laboratory started research and general routine work on the major natural resources of Manchuria, which are now worked on a large-scale industrial basis. For instance, reports on the research and laboratory work on coal, Fushun oil shale, natural soda, soya-bean oil and cabbage were issued in the first report of the Central Laboratory in 1910. While conducting this research and laboratory work on natural resources, the Central Laboratory was at the same time investigating hygienic and sanitary affairs in Manchuria, with special emphasis on the water supply, thus making important contributions to the improvement of health conditions in Manchuria, particularly in railway and industrial circles.

Period of Industrial Initiation

The second period, which was of industrial initiation, lasted from the beginning to the end of the Taisho Era, namely from 1912 to 1925. In this period, studies were made on those natural resources, on which research and laboratory work had been conducted in the preceding period, for the purpose of contributing to their industrialization. Selecting those natural resources which would be amenable to industrialization, the Central Laboratory set about industrializing them, by introducing experts from Japan or Europe and by conducting semi-industrial experiments on them.

Early in the Taisho Era, the Central Laboratory purchased from Europe an apparatus for extracting oil from soya-beans using benzene as a solvent and installed it in an experimental plant at Ssuerhkou in Dairen. This was the first plant for extracting oil from soya-beans to be operated by Japanese in an industrial way. This experimental plant proved a success and was later transferred to the Suzuki Firm. It is now being operated in a greatly expanded form, as the Dairen plant of the Honen Oil Company, Ltd. The soya-bean oil industry, which had its inception in the Central Laboratory is now operated on a large scale even in Japan proper. Every year 500,000 tons of soya-beans are now treated for oil extraction.

The Hardened Oil Industry

The manufacture of oil substitutes for expensive animal fats was first studied by Norman of Germany. He discovered and industrialized in 1906 a process for hardening cheap vegetable

oils like soya-bean oil by treating them with hydrogen with nickel as a catalyst. A few years later, the S.M.R. Central Laboratory invented a process of its own and commercialized the manufacture of hardened oils, which is now carried on by the Dairen Oils and Fats Industrial Company, Ltd. Thus, the Central Laboratory was the pioneer in the hardened oil industry in this part of the world, paving the way for the present success of the hardened oil industry in Japan, where it forms one of the most important branches of industry in general.

Fire-brick, Ceramic and Glass Industries

The Central Laboratory has been conducting research work on the ceramic industry in a trial plant, which has been devoted to the experimental manufacture of fire-bricks, ceramic wares and glass from materials available in Manchuria. The Dairen Ceramic Works, Ltd. and the South Manchuria Glass Co., Ltd. represent a consummation of the research work conducted so patiently and systematically by the Central Laboratory. These two business corporations were organized in the latter part of the Taisho Era (1912-1925). The Shoko Glass Co., Ltd., which was established later in Dairen, is manufacturing plate glass by means of a process evolved by the Central Laboratory. Thus the Central Laboratory has been instrumental in making possible the organization of those business corporations now engaged in the ceramic industry, by demonstrating scientifically the possibility of conducting this line of industry on a commercial basis using materials available in Manchuria.

Furthermore, the Central Laboratory has scientifically explained the unique Chinese process of manufacture of porcelain and china-ware, which has hitherto defied any attempts at such explanation. At the same time, the Laboratory started research work on the manufacture of high-grade glass by using the silica produced in the Kwantung Leased Territory, which is also used in making Chinese porcelain. The process of manufacture of cut glass has been evolved by the Laboratory, which engaged experts from Bohemia and supervised the training of skilled workers. The cut glass industry, which is now developing in Japan proper is based on a process evolved by the S.M.R. Central Laboratory. The process of manufacture of "lignoid," a sort of Sorel cement, from magnesite produced in Manchuria was also invented by the Laboratory. It has been industrialized by the South Manchuria Mining Co., Ltd.

In its third period, one of original industrial activity, which extends from the end of the Taisho Era (1925) down to the present day, the Central Laboratory has emerged from the stage of mere research and laboratory work or imitation of established industries and launched upon original research and laboratory work with a view to creating new, original industries. Processes thus evolved by the Laboratory are industrialized in Manchuria, while the reports of the Laboratory on its research work are attracting growing attention from the scientific world in Japan. These reports include papers on "Research on the fermentation of kaoliang gin," "Research on oil shale and shale oil," "Research on the Manufacture of Fuel Oil by Dry Distillation of Soya-Bean Oil with Fatty Acid and Lime Treatment," "Research on Chinese herb medicines," "Research on the Fermentation of Aceton-Butyl Alcohol," and "Research on the Extraction of Soya-Bean Oil with Alcohol Treatment."

Of the new industries which have been organized on the basis of research carried out by the S.M.R. Central Laboratory, the following are the most important.

The Shale Oil Industry

Utilization of the oil shale seam which forms the upper part of the coal veins in the Fushun colliery has attracted the attention of the S.M.R. Central Laboratory since its establishment. The first report of the Central Laboratory, made public in 1910, outlined part of the research work conducted on this problem. Research work on the oil shale has been kept up and in 1921 its chemical composition was made clear by boring into the various parts of the oil shale seam. Research and laboratory work on the dry distillation of oil shale and the by-products from dry distillation have been completed so successfully that the shale oil industry has been placed on a commercial basis. Invention of an internal combustion apparatus for dry distillation at the Fushun colliery

made it possible to industrialize the manufacture of shale oil in 1928. The success of this new branch of industry may be gauged from the fact that the amount of shale oil now produced is almost equal to the amount of natural petroleum produced in Japan. A plan for the expansion of the shale oil industry on a large scale has already been worked out and is now being executed, thus making a substantial contribution to the successful execution of the Government's fuel policy.

In connection with the shale oil industry at Bujun (Fushun), the Bujun (Fushun) Cement Company, Ltd. is manufacturing high-grade cement on the basis of a process evolved by the S.M.R. Central Laboratory. In working oil shale deposits, small fragments are produced in large quantities, but they are unfit for use in the retorts in which shale oil is manufactured. They are, however, superior material for the manufacture of cement. Besides, they save the cost of production of raw materials as well as the cost of fuel for burning raw materials in manufacturing cement. These factors are fully utilized by the Bujun Cement Co., Ltd.

Aluminium and Magnesium

Manchuria holds out every possibility of success for the light metal industry, blessed as it is with rich deposits of alumina clay and magnesite as well as with ample water and coal power resources.

The process of manufacture of aluminium by means of electrolysis was invented by Charles Hall about half a century ago. It has been extensively industrialized in Europe and America, where the raw material used, however, is bauxite. But no bauxite deposit is found in the Japanese Empire or in Manchuria. Nor is alum, the most convenient raw material next to bauxite, found in any large quantity. Therefore the aluminium industry in Japan must be developed with alumina clay as raw material, because deposits of this are found in large quantities in the Japan-Manchoukuo-China area. Research on the manufacture of aluminium with alumina clay as raw material has a history of only twenty years and most of it, at that, has been done in Japan. The S.M.R. Central Laboratory started research on the manufacture of aluminium with alumina clay as raw material some years ago. After conducting laboratory work on the extraction of alumina from alumina clay by dry, wet and dry-wet processes, the Laboratory has succeeded in evolving the so-called alum-acid-lime process, which has proved most efficient in extracting alumina from the alumina clay found in Manchuria. An experimental plant on a semi-industrial scale was first set up at Fushun for the purpose of manufacturing aluminium on a large scale, and the process was eventually commercialized by the Manchuria Light Metal Industry Co., Ltd. The company at first produced 4,000 metric tons of aluminium annually, but it has started work on the construction of another plant at Antung, with a view to expanding its annual production.

The magnesite deposits at Tashihchiao in Fengtien Province can, from both the quantitative and qualitative point of view, bear comparison with similar deposits anywhere else in the world. In 1913, when these deposits were discovered by an exploration party of the South Manchuria Railway Company, the Central Laboratory immediately started research work on their utilization, and succeeded in manufacturing "lignoid," a sort of Sorel cement from magnesite ore. The Laboratory also conducted research work on the manufacture of magnesium from magnesite ore. In 1932, the Nichi-Man Magnesium Company, Ltd. was set up at the town of Ube in Yamaguchi Prefecture in Japan for the purpose of manufacturing magnesium by co-ordinating the process evolved by the Central Laboratory for the manufacture of magnesium from magnesite and that evolved by the Physico-Chemical Research Institute for the manufacture of magnesium from brine. Again, in 1938, the Manchuria Magnesium Co., Ltd. was established at Yingkou for the purpose of manufacturing magnesium on the basis of a process evolved by the Central Laboratory.

The Soya-Bean Industry

The soya-bean tops the list of agricultural products in Manchuria, accounting for the bulk of that country's exports. No wonder, therefore, that the prosperity of Manchuria is closely tied up with this crop and the price it brings in the markets of the world. Since its establishment, the S.M.R. Laboratory has been conducting research and laboratory work on the soya-bean from

every possible angle. The Laboratory has standardized the chemical analysis of the soya-bean, thus establishing a technical basis for the mixed storage inspection of soya-beans, now enforced by the Government of Manchoukuo.

It was the Laboratory that was responsible for establishing a plant for extracting oil from soya-beans with benzene as a solvent, thus contributing to the development of the soya-bean industry. In 1927, research on the extraction of soya-bean oil by alcohol treatment was started, with the result that a special apparatus for the purpose was designed and the Manchuria Soya-Bean Industry Co., Ltd. was set up in 1934 for extracting soya-bean oil on the basis of the new process. Extraction of soya-bean oil by means of treatment with alcohol remains to be organized on a large-scale industrial basis, but the new process is characterized not only by production of high-grade soya-bean oil and bean-cake, but by isolation of useful components of the soya-bean such as lecithin, vitamin B and others, which were not possible of extraction under the old processes.

Liquefaction of Coal

A drop of oil is reported to be as valuable in time of war as a drop of blood. It is hardly necessary to mention that self-sufficiency in liquid fuel is vitally important for Japan, which is not blessed with oil deposits. The S.M.R. Central Laboratory has already made no small contribution to the development of the shale oil industry, by completing the basic research work on the manufacture of shale oil. Now that a law has been enacted to provide for the promoting of coal liquefaction on an industrial scale, the Laboratory is taking an active part in this new branch of industry.

The S.M.R. Central Laboratory has been conducting basic research on the direct liquefaction of coal for more than ten years, paying particular attention to its industrialization. Meanwhile, the S.M.R. plant at Fushun for the liquefaction of coal on the basis of a process evolved by the Navy Fuel Depot, carried out a great revision in its plans and requested the Central Laboratory to participate in the management of the plant. Consequently, the Laboratory decided to co-operate with the plant in perfecting the process of coal liquefaction on the strength of its many years research experience in this field.

In accordance with the revised plan, work on the construction of the plant at Fushun has been expedited since 1937 and a trial operation of part of the technical equipment in the plant was successfully carried out in February, 1939. Trial operation of the machinery, kept up since, proved a success; hence on July 22, 1939, the President of the South Manchuria Railway Company and the Director of the Publicity Bureau of the Navy Office simultaneously announced the success attained by the Fushun plant in liquefying coal.

F. Bergius was the first to succeed in manufacturing fuel oil by liquefying coal in 1913, but it is only in the last few years that industrialization of his process has been successfully attempted. Of all the branches of the chemical industry, the liquefaction of coal is regarded as one of the most difficult in respect of technical installation. This accounts for the fact that Germany is the only country in the world where this process has been industrialized. In Germany brown coal is used for liquefaction, but the plant at Fushun has to use bituminous coal, which is more difficult of liquefaction. Credit is due the Fushun plant for its success in liquefying coal within a year of its establishment, obliged as it was to use such difficult coal and to depend upon technical equipment, which were made in Japan with materials produced at home; especially since liquefaction of coal in Germany and Great Britain has a long record of difficult experiments behind it. The coal liquefaction plant at Fushun still remains an experimental one so far as size is concerned, but in producing oil of such fine quality, the plant has succeeded in establishing the foundation for regular industrialization of coal liquefaction, thus marking an epoch in the annals of liquid fuel in Japan. An old saying has it that those who dominate petroleum supplies will dominate the world. In this sense, the coal liquefaction plant at Fushun provides Japan with a modern weapon to safeguard her righteous cause, of which fact the Central Laboratory may well feel proud, though it has in effect only discharged successfully its duty in accordance with the aim of its founders.

Manufacture of Sponge Iron

Following the birth of Manchoukuo, various new national resources in Manchuria have been tapped, including rich iron deposits in Tungpientao Province. The S.M.R. Central Laboratory has completed researches on the utilization of these deposits for the purpose of manufacturing pure iron from them, and an experimental plant has been set up at Fushun to manufacture 30,000 tons of iron annually by using ore from those deposits as raw material.

The process evolved by the Laboratory aims at reduction of the ore at a comparatively low temperature in a rotary kiln containing a mixture of coke and the rich iron ore produced in Tungpientao Province, following which the iron is purified by melting it in an electric furnace. Iron thus manufactured is possessed of greater viscosity, compared with iron manufactured by the furnace process and is highly esteemed as raw material for making special types of steel. Japanese swords made of this iron have captured the fancy and imagination of the Japanese people.

Researches on this kind of pure iron are being carried on in various parts of Japan and Manchuria. Certain processes for the manufacture of pure iron have already been commercialized together with that evolved by the S.M.R. Central Laboratory; thus there appears to be a bright future ahead of this new branch of industry.

There are other processes, evolved by the S.M.R. Central Laboratory, which have been already industrialized or are going through experiments with that end in view, including fermentation of acetone-butanol and mineral separation by "flotation."

The research and laboratory work conducted by the Central Laboratory has been bearing fruit in industrialization since the beginning of the Showa Era (1926), and has been a substantial factor in the successful execution of Manchoukuo's Five-Year Industrial plan, and with the development of the China Incident the Central Laboratory is being called upon to extend activities to other fields.

Industries Which Have Been Commercialized

The various branches of the Chemical industry which have been commercialized on the basis of processes evolved by the S.M.R. Central Laboratory or which have entrusted their research problems to the Laboratory include:—

(1) MAJOR LINES OF THE CHEMICAL INDUSTRY COMMERCIALIZED ON THE BASIS OF PROCESSES EVOLVED BY THE CENTRAL LABORATORY

(In 1,000 yen)

Business Corporations (or Factories)	Capitalization (or Working Funds)	Enterprises
(1) The Honen Oil Co.	10,000	Extraction of soya-bean oil
(2) The Dairen Oils and Fats Industrial Co.	500	Hardened oils
(3) The South Manchuria Mining Co.	3,600	Magnesite articles
(4) The Dairen Ceramic Works, Ltd.	1,200	Fire-bricks
(5) The South Manchuria Glass Co.	300	Glass
(6) The Sankyo Company, Ltd. (Dairen Works)	—	Bean-cake and soy
(7) The Fushun Shale Oil Plant (The S.M.R. Fushun Coal Mines)	20,000	Shale oil
(8) The Manchuria Chemical Industry Co. (Hydrogen Plant)	—	Hydrogen
(9) The Manchuria Soya-Bean Industry Co.	5,000	Extraction of soya-bean oil
(10) The Fushun Cement Co.	2,500	Shale cement
(11) The Manchuria Light Metal Industry Co.	50,000	Aluminium
(12) The Manchuria Magnesium Co.	10,000	Magnesium
(13) The Fushun Coal Liquefaction Plant (The S.M.R. Fushun Coal Mines)	20,000	Synthetic oil
(14) The Fushun Experimental Iron Works (The S.M.R. Fushun Coal Mines)	2,000	Pure iron
(15) The Manchuria Special Products Industrial Co.	—	Refined Kaoliang

(2) MAJOR ENTERPRISES WHICH HAVE ENTRUSTED THEIR RESEARCH PROBLEMS TO THE CENTRAL LABORATORY

(1) The Manchuria Bean Husk Pulp Co.	Pulp
(2) The Yamato Dyes Co.	Dyes
(3) The Showa Steel Works, Ltd.	Mineral separation and fireproof materials
(4) The Manchuria Coal Mining Co.	Briquettes
(5) The Dai Nippon Celluloid Co.	Soya-bean albumin
(6) The Mitsubishi Paper Mills Co.	Soya-bean albumin
(7) The Daiichi Seiyaku (Pharmaceutical) Co.	Oils and fats
(8) The Manchuria Mining Development Co.	Mineral separation
(9) The Manchuria Magnesium Co.	Magnesium
(10) The Manchuria Chemical Industry Co.	"Wet way" Aluminium
(11) The Morinaga Confectionary Co.	Soya-beans
(12) The South Manchuria Mining Co.	Magnesite articles
(13) The Tungpientao Development Co.	Mineral separation
(14) The Manchuria Soya-Bean Industry Co.	Soya-beans
(15) The Tatung Alcohol Co.	Aceton-butanol
(16) The Manchuria Light Metal Industry Co.	Aluminium
(17) The Showa Industrial Co.	Gurtamin soda
(18) The Dairen Industrial Co.	Waterproof cloths
(19) The Showa Steel Works, Ltd.	Firebricks
(20) The Tungshing Mining Co.	Mineral separation
(21) The Manchuria Jute Co.	Bleaching of Jute
(22) The Manchuria Special Paper Manufacturing Co.	Decolorization of waste paper

The S.M.R. Central Laboratory, in pursuance of the aim of its founders, has been conducting research and laboratory work on the utilization of natural resources in Manchuria. It has been able to proclaim various achievements and to make great contributions, not only to the industrial development in Manchuria, but also to the advance of science in general and to the raising of technical standards. Besides establishing its position in the scientific world as a physico-chemical research institute, the Laboratory has become the nerve center of the chemical industry of the Asiatic Continent, as a sequel to the growth in scope of the China Incident. Contributions made by the Laboratory to the development of the heavy and other branches of industry in Manchoukuo, which has made a successful debut upon the world stage as a rising industrial power, has already been reviewed in the preceding pages, together with the results attained by its research and routine workers. Manchoukuo's Five-Year Industrial Plan further adds to the Laboratory's responsibilities by calling on it to redouble its efforts in all the fields in which it has been working.

The electro-chemical industry, which will develop in connection with the gigantic expansion of electric power production which is provided for in the Five-Year Industrial Plan, and the coal-tar industry, which will grow with the increased production of iron, also provided for in the plan must be organized on the basis of research to be carried out by the Central Laboratory. Attention must also be paid by the Laboratory to the manufacture of pulp and fibre, mineral separation or dressing, manufacture of fireproof materials and other questions. On the other hand, with the progress of the China Incident the Central Laboratory is called upon to pay no less serious attention to the development and utilization of raw materials in the vast territory embracing North to Central China.

In the face of this situation the S.M.R. Central Laboratory is now carrying out research and routine laboratory work on a wide and varied range of subjects, of which the major ones are enumerated below.

Coal :

- (1) Researches on liquid fuel (Direct Liquefaction and High-Pressure Synthetic Process).
- (2) Manufacture of hydrogen.
- (3) Researches on the hardening of coal and manufacture of briquettes.
- (4) Researches on the products of dry distillation and acetylene derivatives.

Oil Shale :

- (1) Manufacture of high-grade Diesel oil from oil shale.
 - (2) Researches on the manufacture of cylinder oil from oil shale paraffin.
- Researches on the Manufacture of Aluminium from Alumina Shale.*

Magnesite :

- (1) Manufacture of magnesium by direct reduction.
 - (2) Researches on special fire-bricks.
- Mineral Separation or Dressing (For Treatment of Poor Ore).*

Soya-Beans :

- (1) Researches on the new process of extraction of Soya-Bean Oil.

- (2) Researches on the Industrial Utilization of Soya-Bean Albumin.

- (3) Processing of Soya-Bean oil.
(Hardened oil, high-grade alcohol and rubber substitute).

- (4) Researches on the Ingredients of Soya-Beans.
(Vitamin B, sucrose and stachyose)

Kaoliang and Maize :

- Fermentation of Aceton-Butanol.

Wood and Plants (Bean-Husks, Cotton-Stalks and Reeds) :

- (1) Researches on the Manufacture of Pulp.

- (2) Researches on Synthetic Fibres.

- (3) Manufacture of Tannin and its Derivatives.
(Manufacture of White Birch Oil)

- (4) Researches on the Saccharification of Wood.

The objectives, methods of research and progress attained in the above-mentioned major fields are outlined below.

(1) *Coal—Liquid Fuel.*—At the Fushun experimental plant success has already been attained in industrializing the direct liquefaction of Fushun coal on the basis of a process evolved by the S.M.R. Central Laboratory, as already mentioned. Research on the liquefaction of coal, which is absolutely necessary for the execution of the national policies should not, however, be allowed to stop with such a success, especially since Japan's coal resources have been expanded with the development of the China Incident. Therefore, the Central Laboratory has conducted research work on the properties of coal produced in Manchuria and North China as well as on new solvents and reagents. In the process of carrying out fresh researches from every possible angle, the Laboratory has succeeded in discovering an efficient new solvent for use in the secondary hydrogenation process, namely at the stage of gasolization by treatment with hydrogen of the intermediate oil produced by direct liquefaction. The Laboratory is now conducting industrialization experiments on this new process.

The so-called Fischer process, which synthetically manufactures liquid fuel for use in internal combustion engines from water gas kept under constant pressure in presence of a catalyst has made a remarkable development both in Germany and Japan. An improvement on the process, aiming at the synthetic manufacture of liquid fuel under high pressure has seldom been tried elsewhere, involving as it does considerable technical difficulty. But the Central Laboratory has carried out research on this improved method by adapting the high pressure technique developed in connection with the direct liquefaction of coal. Now that it has discovered a superior catalyst, the Laboratory has started industrialization of the improved process.

Hydrogen.—With hydrogen used extensively in connection with the direct liquefaction of coal, and the manufacture of synthetic benzene and ammonium as well in the coal-tar and oil and fat industries, it has become very necessary to find a cheap way of manufacturing hydrogen. Consequently, the S.M.R. Central Laboratory has been conducting research on the manufacture of hydrogen from water gas, and has succeeded in industrializing the process, which is now used by the Manchuria Chemical Industry Co. and the Coal Liquefaction Plant at Fushun. The same process is also being used by various factories in Japan proper engaged in the manufacture of sulphate of ammonia.

Going a step farther, the Central Laboratory has started research on the manufacture of hydrogen from water gas under high pressure. It is now testing the industrial value of a new catalyst it has discovered, which seems to be very effective in this connection.

At Jalai Nor there are very big brown coal deposits, which constitute one of the most important natural resources in Manchuria. The pity is that Jalai Nor brown coal contains over 50 per cent of water and easily cracks and crumbles, which makes transportation over any real distance and even storage for any length of time quite impossible. At the request of the Manchuria Mining Company, the Central Laboratory investigated the hardening of this coal and has perfected a process of making briquettes from it.

By-Products of Dry Distillation

Coal occupies an extremely important place in industry, not only as a fuel and the raw material for the manufacture of liquid fuel, but as the basis raw material for the chemical industry.

Coal-tar, derived from the dry distillation of coal, and carbide, produced from coal by the action of electricity form the backbone of the chemical industry. A phenomenal increase in the production of coal-tar is promised in Manchuria, as the result of the remarkable development of the coal distillation industry and also of the projected large-scale expansion of the Showa Steel Works, Ltd.

The S.M.R. Central Laboratory has recently started research and laboratory work on the utilization of coal-tar. Its researches on the manufacture of indanthrene-hydrone blue by processing the anthracene fraction have proved so successful that the stage has already been reached for making an intermediate experiment. Experiments on the manufacture of aniline from nitro-benzol through hydrogen reduction with nickel as catalyst have been completed, so that the process developed by the Laboratory is now being commercialized.

An ingredient of coal-tar is also found to be an efficient agent in flotation separation of poor ore of the type, produced at Anshan. An industrial experiment on this problem is now being conducted.

Manchuria will have established a most advantageous position in organizing and running the acetylene industry in a few years, thanks to the vast coal deposits in that country and the electric energy, which will be supplied extremely cheaply and in a volume several times as large as at present, as the result of increased generation of electricity from both water and coal power now under way. In view of the situation, the Central Laboratory has started research and laboratory work on the manufacture of synthetic rubber and resin from acetylene, with a view to establishing one branch of the acetylene industry on a firm basis so as to secure sound development of the whole industry.

(2) *Oil Shale*.—The shale oil industry at Fushun, which is based on a process evolved by the Central Laboratory, occupies an important position in the synthetic oil industry of Japan. The Laboratory is keeping up researches on the processing of shale oil manufactured at Fushun. Heavy shale oil manufactured at Fushun is excellent as a fuel for Diesel engines; however, in view of the fact that its properties are not perfect, the Laboratory has conducted research on this question and has succeeded in making it a high-grade Diesel oil by a special process of washing with dilute sulphuric acid. This process of washing with dilute sulphuric acid is characterized by the production from the waste acid or sludge of a solvent for use in the liquefaction of coal. With the completion of the plan for increased manufacture of Fushun shale oil, the manufacture of this solvent from the sludge will be industrialized. The Laboratory has also perfected a process of manufacturing cylinder oil from paraffin derived from Fushun shale oil, by a two-way chloridation using zinc chloride as catalyst. Manufacture of this cylinder oil will be soon started at a plant, which is now being designed by the General Directorate of Railways of the South Manchuria Railway Company.

(3) *Alumina Shale*.—The S.M.R. Central Laboratory has perfected a process for manufacturing aluminium from rich ore in alumina shale found in Manchuria by combining the dry and wet methods. The Manchuria Light Metal Manufacturing Company, which was set up at Fushun, is manufacturing aluminium on the basis of this process. The Laboratory has also evolved a process of manufacturing aluminium from poor ore in alumina shale, of which the deposits in Manchuria are almost inexhaustible. The process is based on the two-way treatment with alum, acid and lime. It has already emerged from the laboratory stage and has successfully gone through industrialization experiments. A by-product of this process is sulphate of ammonia; therefore, it will be susceptible of profitable commercialization, if undertaken by an ammonium sulphate manufacturing concern. The aluminium manufactured by this process has a high percentage of purity.

(4) *Magnesite*.—The Central Laboratory has invented a process for manufacturing magnesium from magnesite which is found in Manchuria, and which is first reduced into anhydrous magnesium chloride before being electrolysed into magnesium. The process has been commercialized by the Manchuria Magnesium Industrial Co., which is setting up a plant at Yingkou for the purpose.

The Central Laboratory is also conducting research on the manufacture of magnesium by reducing magnesite directly with a reducing agent and then distilling it. This process, too, by which magnesium can be manufactured at a comparatively low temperature, has emerged from the stage of laboratory work and preparations are being made for conducting a semi-industrial ex-

periment on it. The magnesium produced by this low temperature process is noted for its high degree of purity and it is expected that the new process will eventually replace the old electrolytic process.

Special Firebricks.—Silica firebricks employed in constructing furnaces for use in the iron manufacturing industry have many weak features, because their melting-point is low and they are acid in nature. Besides, Manchuria does not produce the proper type of silica for manufacturing firebricks. This has stimulated the Central Laboratory to start research on the production of firebricks from magnesite ore, which is found abundantly in Manchuria. The process evolved by the Laboratory consists in melting magnesite by electric heat and then moulding it into bricks. The Showa Steel Works, Ltd. is now building an experimental plant at Anshan to manufacture firebricks on a semi-industrial scale on the basis of this process.

The firebrick made by this process is far superior to silica and magnesia bricks in its resistance to heat, pressure and sudden changes in temperature and in its power to withstand corrosion. Therefore, it makes the best material for the construction of furnaces for iron manufacture. Now that the iron and steel industry in Manchuria has been making phenomenal strides, the successful manufacture of such superior firebricks is most opportune. Much is expected of the industrialization of the new process of firebrick manufacture.

(5) *Mineral Separation*.—Deposits of poor iron ore, containing 25 to 30 per cent of iron are found near Anshan in almost inexhaustible quantities, but they are not suitable, as they stand, for iron manufacture. But Showa Steel Works, Ltd. at Anshan is using this poor ore as raw material for the manufacture of iron, after subjecting it to magnetic separation. Hitherto, flotation separation of oxidized ore has been regarded as almost impossible, but the S.M.R. Central Laboratory has succeeded in separating the poor ore produced at Anshan by a flotation process in which a special mineral oil produced in Manchuria is used as medium. This process has successfully gone through the laboratory stage and also the stage of intermediate experiments in which 20 metric tons of poor ore were treated per day. A full-size industrial experiment is now being carried out at Anshan by treating 500 metric tons of poor ore every day.

The process itself is simple, while, the separated ore contains over 60 per cent of ferrous material with an actual yield of 85 to 90 per cent of iron. Thus the flotation separation process invented by the Laboratory is expected to prove more profitable economically than the magnetic separation process. Setting aside the big contribution which it will make to the development of the iron manufacturing industry in Manchuria, it is worthy of special mention that the process successfully applied by the Central Laboratory to poor ore at Anshan is the first successful process for treating on oxidized ore by the flotation method to be devised anywhere in the world.

(6) *The Soya-Bean*.—Industrial utilization of the soya-bean has formed one of the major subjects of research for the S.M.R. Central Laboratory since its founding. The Laboratory has already succeeded in industrializing the process of extraction of oil from soya-beans and the industry for processing soya-bean oil, soya-bean albumin and other ingredients of soya-beans in order to secure full development for the soya-bean industry as a whole. The Laboratory is continuing researches on the following subjects.

Continual Extraction of Soya-Bean Oil

The Central Laboratory, as already mentioned, has been successful in extracting oil from soya-beans using benzene and alcohol as solvents, but there is still room for improvement in the oil extraction equipment.

With the necessity for the maximum utilization of soya-beans making itself increasingly felt in Manchuria, industrial circles have been insisting that continual oil-extraction equipment be evolved in order to enhance the standard of efficiency in the industry. As a result the Laboratory has designed new equipment for the purpose with a screw conveyor attached. Experimental extraction of oil with alcohol as solvent has already been successfully carried out with the new equipment, with which another experimental extraction of oil, using benzene as solvent, is being made. Soya-beans, fed into one end of this new apparatus are eject in a continual stream from the other end in the form of dried refuse from which all the oil has been extracted. The whole process takes place at a markedly lower temperature than formerly with the result that

bean-cakes thus manufactured make greatly superior material for the soya-bean albumin industry.

Extraction of oil from soya-beans using alcohol as solvent has hitherto been carried out by using boiling alcohol, but the Laboratory has recently invented a process of extracting oil with alcohol as solvent at a normal temperature. This process is based on the fact that the soya-bean oil in soya-beans becomes an alcohol soluble fat-oil ester when soya-beans are treated with alcohol, to which a small quantity of catalyst is added. The bean-cakes which are a by-product of this process make superior material for the manufacture of industrial albumin, while glycerine is also manufactured as a by-product of this process.

Soya-bean albumin is an excellent industrial albumin and has a wide range of uses, especially in this country, which is dependent upon foreign countries for the supply of a large amount of the milk casein which it uses. So far, however, it has not proved possible to manufacture soya-bean albumin on a commercial scale, both because soya-bean cakes, suitable for the manufacture of albumin have not been made and because technical difficulty has been experienced in refining albumin from soya-bean cakes. But while extracting soya-bean oil with benzene and alcohol as solvents at a normal temperature, the Central Laboratory has evolved a process of manufacturing albumin from soya-bean cakes. Much is expected of this process which is now being tested on a semi-industrial scale, for it will certainly ensure self-sufficiency in albumin, used as a substitute for casein.

Soya-bean albumin is even now used extensively as a substitute for casein. The Central Laboratory has achieved success in the experimental manufacture of "non-inflammable celluloid," a horny substance derived from soya-bean albumin, by treating it with formalin.

The Laboratory is also conducting research on the manufacture of synthetic fibre from soya-bean albumin as a substitute for raw wool. It will be recalled that Italy is said to have succeeded in manufacturing synthetic wool from milk casein.

Besides, the Central Laboratory has invented a rapid process of brewing soy, using soya-bean cakes as raw material. The Dairen plant of the Sankyo Company, Ltd. is brewing soy on the basis of this process. The Laboratory has also evolved a process of manufacturing sodium gurtamate which is known as "ajino moto" or essence of taste in this country, by treating soya-bean cakes with hydrochloric acid. This process has gone through a semi-industrial experiment. The Laboratory is making a similar experiment on the cotton seeds produced in Manchuria and North China.

Processing of Soya-Bean Oil

The manufacture of hardened oil has been industrialized by the S.M.R. Central Laboratory for the first time in the Far East. The Laboratory has succeeded in hardening soya-bean oil through hydrogenation, thus manufacturing a substitute for beef tallow and placing the hardened oil industry on a firm basis. Researches on hardened oils have been kept up by the Laboratory. It has recently been found that hydrogenation, if conducted in a high-pressure electric field accelerates the reactive capacity of the oil with the result that a superior product is obtained. The Laboratory is endeavoring to industrialize this process, which is also being extended to the hydrogenation of organic compounds other than oil. While hydrogenating soya-bean oil, it has been also brought to light that hydrogenation conducted under high-pressure in the presence of a catalyst other than nickel will result in the manufacture of high-grade alcohol, thus marking a step further than the mere manufacture of hardened oil. This high-grade alcohol is a raw material vitally necessary for the synthetic fibre industry because of its utility as a softening or osmotic agent. It is also valued as cleansing agent for use with the extremely hard water to be found in Manchuria and North China. It is earnestly hoped that manufacture of this sort of alcohol on an industrial scale will prove possible in the near future.

It has been also discovered that soya-bean oil, treated according to a variation of the high-pressure hydrogenation process, will become hydrocarbon oil, namely synthetic petroleum. This process, together with a process evolved by the Central Laboratory for manufacturing synthetic petroleum by reducing soya-bean oil into fatty acid lime and then subjecting it to dry distillation, is of considerable importance in view of Japan's meager liquid fuel resources.

In addition, the Central Laboratory is carrying out research on the manufacture of synthetic rubber and resin by sulphuration, nitration, chloridation and heating of soya-bean oil, with a view to manufacturing various substitutes for important materials.

Other Ingredients of the Soya-Bean

In addition to albumin and oil, the soya-bean contains other useful ingredients, including lecithin, vitamin B, stachyose and sucrose. No efforts have hitherto been made to extract them from soya-beans, but following the industrialization of the Central Laboratory's process for extraction of oil from soya-beans using alcohol as solvent, extraction of those hitherto neglected ingredients has become very easy. This marks another step forward in the soya-bean industry. Lecithin has long been valued as a tonic and an emulsifying agent, it is also a most valuable raw material for the manufacture of margarine in Europe and America. The Central Laboratory has completed researches on the properties and utilization of lecithin, which is manufactured as a by-product in its process for extracting oil from soya-beans using alcohol as a solvent. Sucrose can be used as a raw material in the manufacture of alcohol by fermentation, while stachyose is effective as lactific agent. The Laboratory is conducting researches on its lactific properties. A plan has also been worked out for industrializing the manufacture of vitamin B by utilizing the sucrose contained in the bean refuse.

(7) *Kaoliang and Maize*.—The Central Laboratory has been conducting laboratory work on the manufacture of acetone and butanol by fermenting kaoliang and maize, produced in Manchuria for several years past and semi-industrial experiments recently made have proved a success. Actuated by the desire to ensure the sound development of this fermentation industry, the Laboratory has developed a process for generating a large quantity of vitamin B₂ compounds or flavin in the fermentation fluid as well as a process for manufacturing yeast from the waste fluid. Acetone and butanol are vital raw materials for the paint and gunpowder industries, but their production in this country has so far been limited. Manufacture of these two compounds is, however, being industrialized in Manchuria on the basis of a process evolved by the Central Laboratory.

(8) *Wood and Plants (Bean Husks, Cotton Stalks and Kaoliang Husks) Pulp*.—The rayon and staple fibre industries in this country are developing in spectacular fashion. A major factor in this rapid growth is the desire to attain self-sufficiency as regards fibre resources but at present these industries are suffering from a shortage of raw materials, to overcome which both Japan and Manchoukuo have formulated plans for the increased production of pulp. The Central Laboratory is, in fact, now engaged in experiments on the manufacture of pulp from white birch, larch and cotton stalks, which are found in abundance in Manchuria and North China.

Synthetic Fibre.—The Central Laboratory is conducting researches not only on the manufacture of rayon pulp from new raw materials found in Manchuria and North China, but also on problem of finding the most efficient process for manufacturing rayon and staple fibre from the pulp thus made. A new process of manufacturing synthetic fibre from soya-bean husks has already been invented by the Laboratory, which is also carrying out research on the improvement of staple fibre by admixture with animal matter or by acetating it.

Tannin and Its Derivatives.—Tannin and its derivatives are essential for the tanning industry, but their production in Japan is limited. The Central Laboratory is conducting research on the manufacture of tannin from various barks, and is also manufacturing lignin from pulp waste with a view to using it as a tanning agent by changing it into sulphone oil.

The white birches extensively found in Manchuria are now used only as firewood, but it is evident that they will be used in the near future as piles or as raw material for the manufacture of pulp. The Central Laboratory is now carrying out research on the utilization of white birch bark. By subjecting white birch bark to dry distillation, the Laboratory has extracted an oil from which a phenol-like matter has been isolated, while the charcoal produced during dry distillation of the white birch bark is being found useful as an absorbent, etc.

Alcohol.—The Central Laboratory has already completed researches on the manufacture of alcohol, one of the most important liquid fuels in Japan, from starch, which is so abundantly produced, by the amylolytic process and also by saccharization with acids. Semi-industrial experiments conducted in connection with these processes have proved satisfactory and the Laboratory is now conducting research on the manufacture of alcohol from wood by gradual saccharization under pressure with dilute acids. A similar experiment is being made on kaoliang husks, which are thrown away at present.

(Continued on page 72)

Philippine Iron Ore is Mined for Blast Furnaces of Japan

(American Chamber of Commerce Journal,
Manila)

THE manufacture of iron and steel in Japan began in 1901, with the construction of a single state-managed foundry at Yawata. Since that year the industry has grown steadily in importance, until in 1939 Japan accounted for five per cent of the world's total output of steel ingots and castings and according to the magazine "Iron Age," ranked sixth among the leading steel-producing nations with an output of 6,230,000 tons. Production has virtually doubled during the last five years.

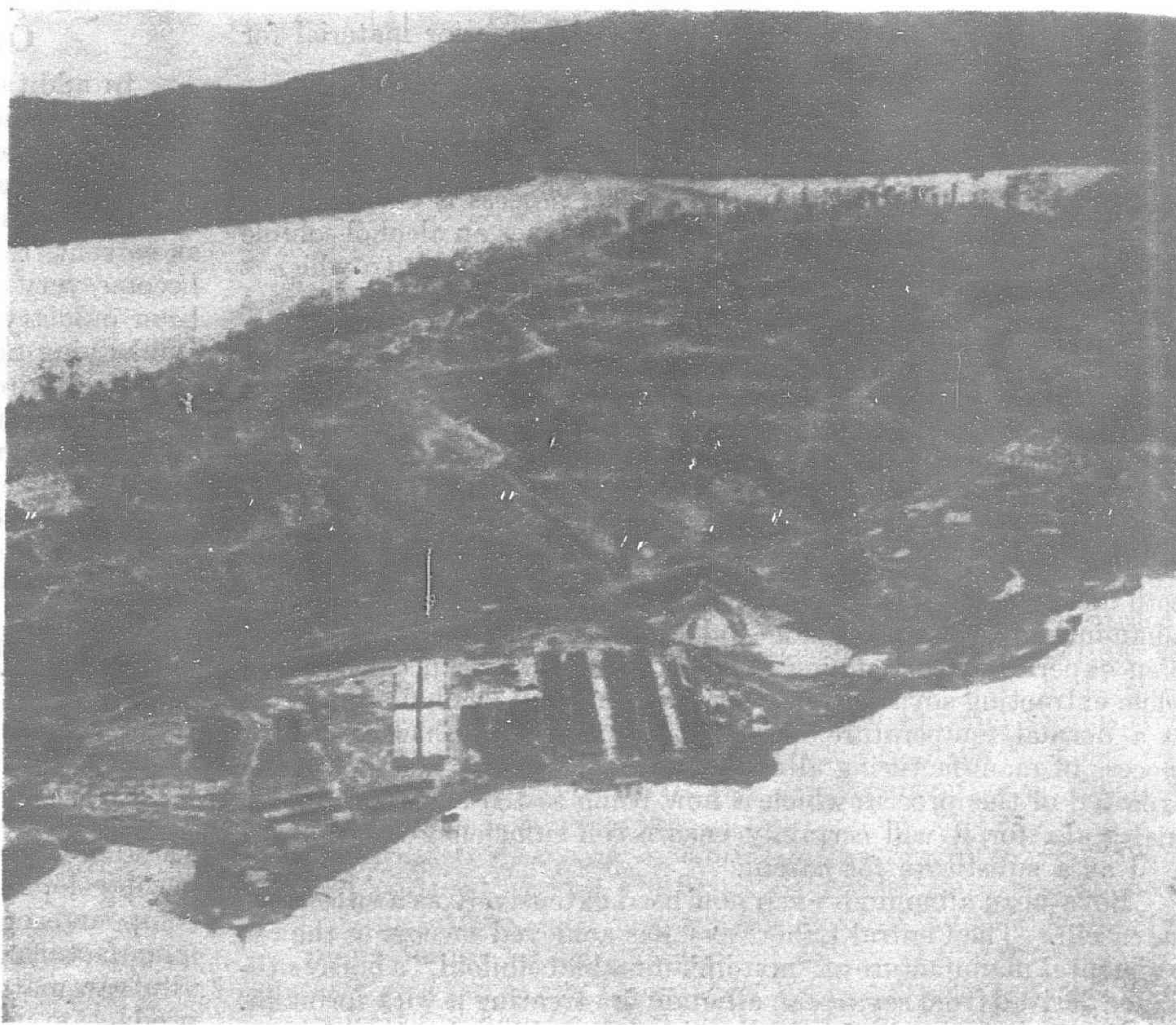
Late figures for production of pig iron in Japan are not available. The Japan-Manchoukuo Yearbook for 1939 states that production in 1936 was 2,007,500 metric tons. It is likely that pig iron output has increased, but hardly in ratio with steel production, as enormous imports of scrap iron have been brought in to supplement the deficiency in pig. The same authority notes that on the average the use of scrap in all Japanese foundries is to the extent of 58 per cent as against 42 per cent for pig.

In a modern well-built and well-operated blast furnace it might well require, in order to make one ton of pig iron, two tons of iron ore, one ton of coke, and half a ton of limestone. Japan's supply of both coking coal and iron ore is limited. The iron ore deposits of that country are estimated at 80,000,000 metric tons, and for Korea, 10,000,000 tons. It is reported that only 12 iron mines in Japan were operated in 1939, and six in Korea. The output from these sources in 1936 was only 1,250,000 metric tons, according to the Japan-Manchoukuo Yearbook.

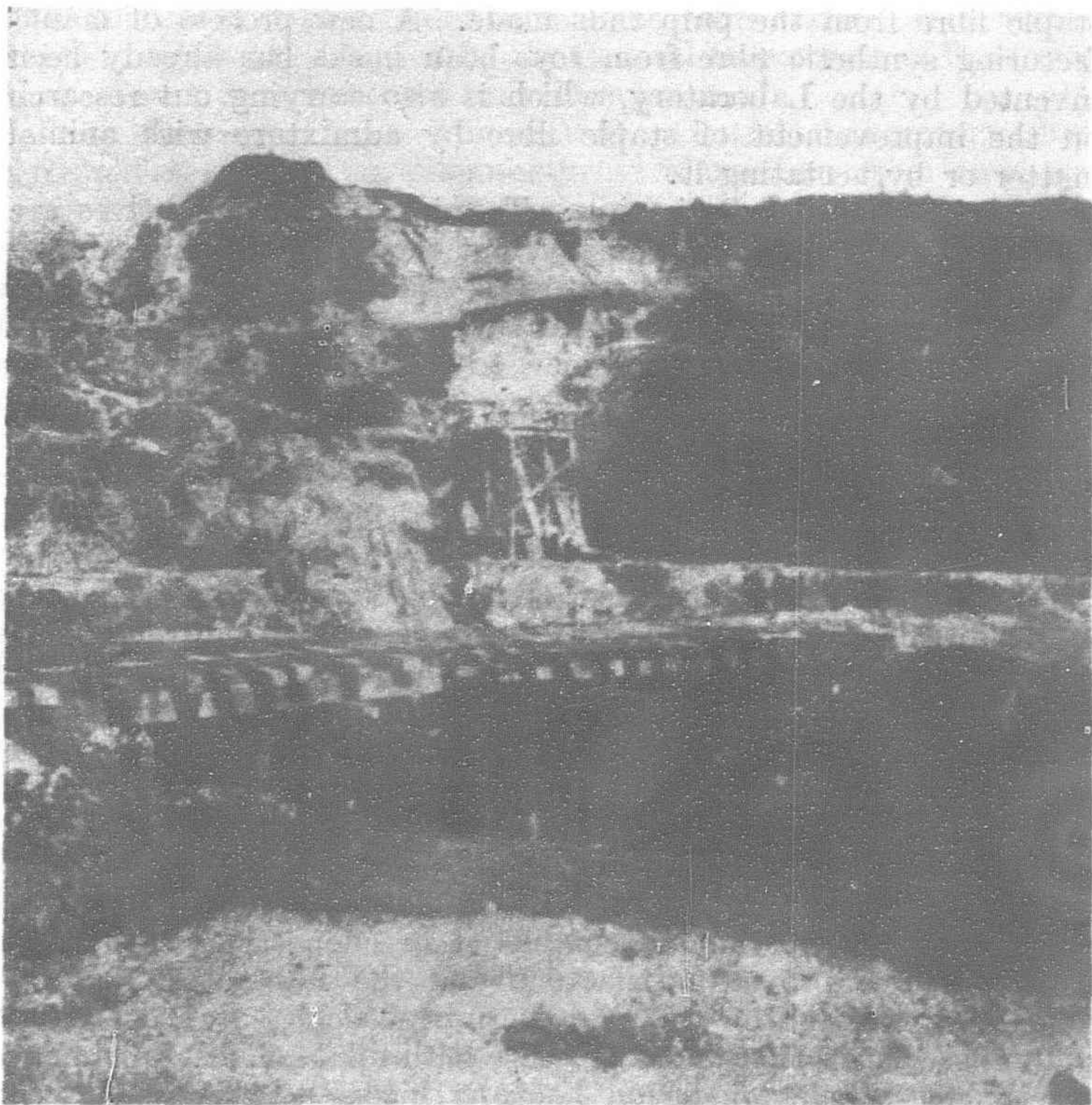
The U.S. Bureau of Mines checks the figure of 2,007,500 tons of pig iron production in Japan approximately for 1936, and in the absence of official data from Japanese sources, estimates produc-

tion in 1937 at 2,500,000 tons, and in 1938 at 3,000,000 tons. Assuming these figures are in line—and no others are available, this indicated that approximately 6,000,000 tons of iron ore at least were required for the blast furnaces. It does not seem likely that over $\frac{1}{3}$ of this tonnage was obtained from domestic iron mines within Japan, and all the balance, in the order of some 4,000,000 tons must have been imported. Indeed, this fact is freely admitted in the Japan-Manchoukuo Yearbook, where it is stated that external sources supply $\frac{2}{3}$ of the Japanese iron ore requirements.

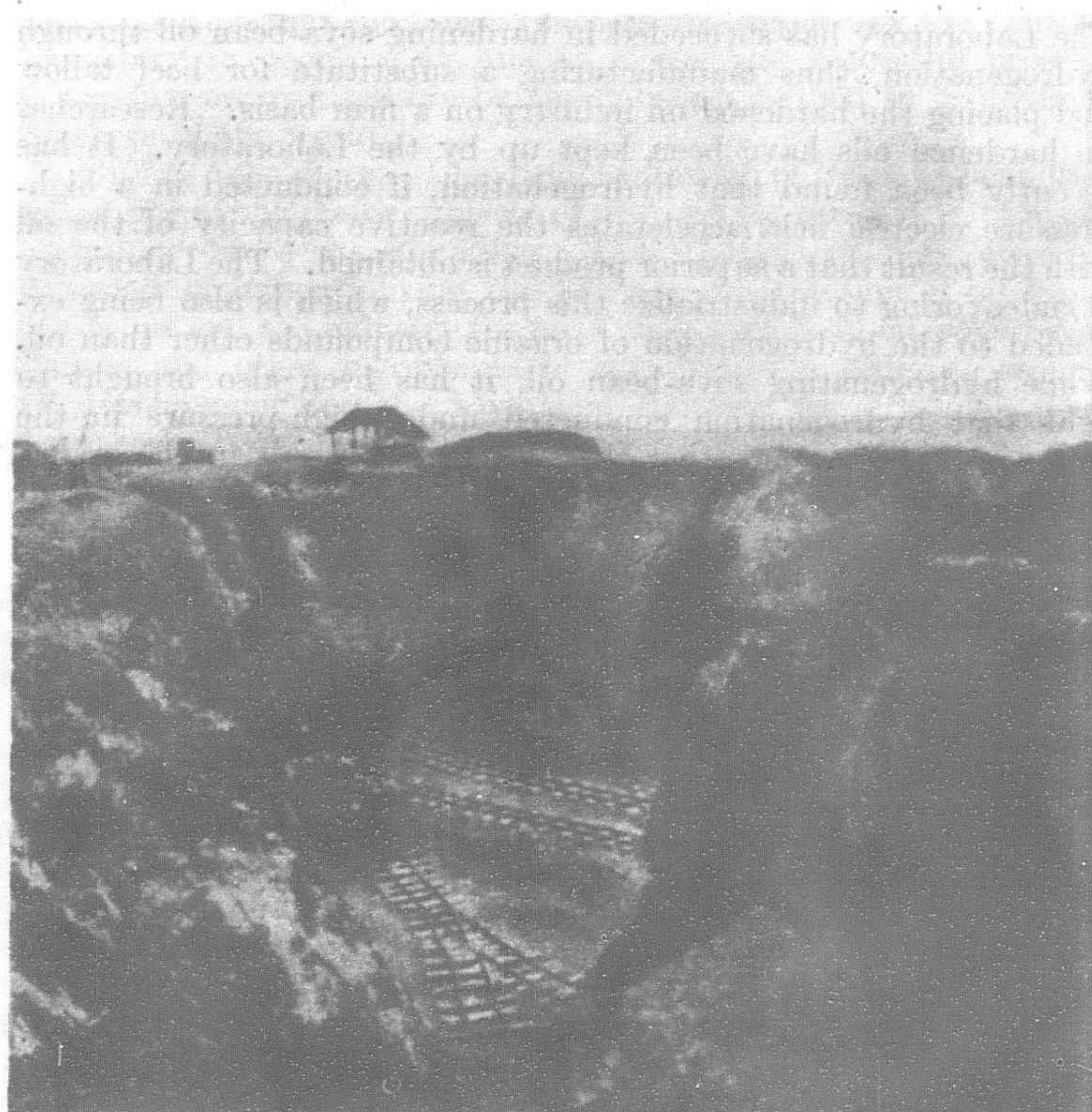
The important place that the Philippine iron mines hold for Japan's steel industry may thus be readily recognized. In 1938, according to official figures, the Philippines exported 912,405 tons of iron ore to Japan, and in 1939, 1,160,096 tons. If freighters can



Air view of the Philippine Iron Mines Property situated at Larap



Bench of the Main Line orebody at Larap

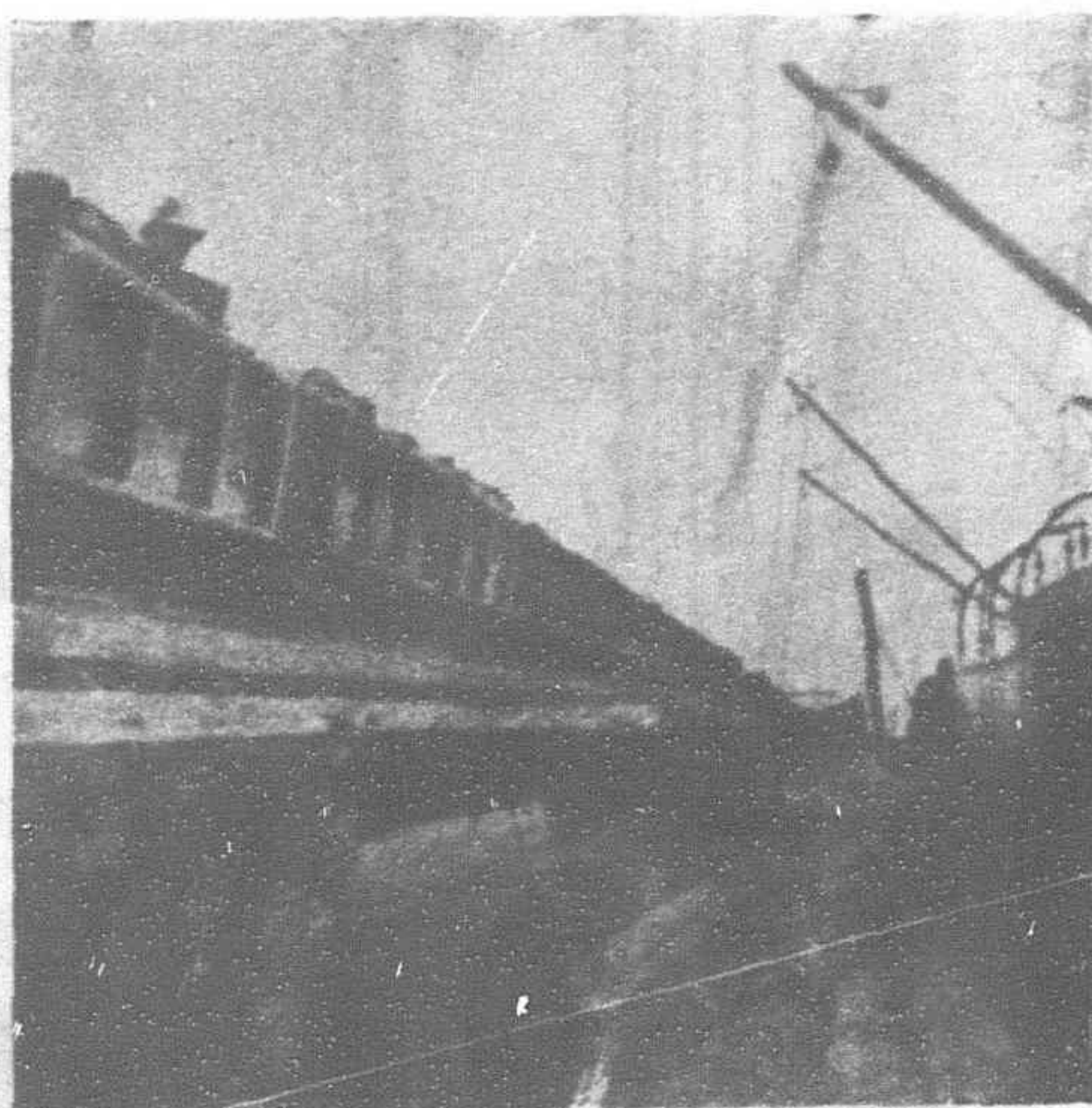


One of the main orebodies of the Philippine Iron Mines Inc.

be had and credits arranged, it is likely that this record figure will be exceeded in 1940. Already it is reported that Samar Mining Company, second largest producer in the Philippines, has shipped about 200,000 tons during the first half of the year, as compared with 290,000 tons for the whole of 1939. Insular Iron Mines, operating in Paracale, has similarly upped its output appreciably.

On the basis of 1939 figures, it appears that the Philippines supplied about 16 per cent of Japan's total iron ore requirements, or about 29 per cent of all the ore imported from abroad. It is not unlikely that in 1940, if conditions do not materially change, as much as 33 per cent may be supplied. It may also be noted that Philippine iron ore as exported is of good grade, averaging over 60 per cent iron, and is probably superior in metallurgical requirements to ore obtained elsewhere in the Orient. Hence considered from a standpoint of iron content the Philippines can probably supply an even larger percentage of the requirements.

The considerable economic stake that both Japan and the Philippines have in the iron ore trade between the two countries is not generally appreciated. The Philippines must look to Japan, and so far as can be seen to-day, to Japan only, as a buyer of its iron ores. The low price of this material, about 4.50 pesos per ton, serves as a definite barrier against shipping iron ore to the United States at the present time. Conceivably an iron and steel industry might be established on the Pacific coast using Washington coal perhaps for smelting, that might take iron ore from here



Loading iron ore directly into ocean freighters from Philippine Iron Mines Inc.

in much the same way that Chilean iron ores are sent through the Panama Canal to the Atlantic seaboard, but such a scheme seems to be for the distant future should it ever materialize.

In the mean time Japan finds itself somewhat in the position of Luxemburg or Germany before the war, with a fair supply of coking coal, an industrial organization for manufacturing steel, and a dearth of iron ore. It is an axiom in steel economics that iron ore goes to coal rather than the reverse. Japan inevitably looks to the Philippine iron mines conveniently located for a supply of ore for her blast furnaces. From standpoint of international trade the situation is a "natural."

What is the situation in iron mining in the Philippines to-day, from a labor standpoint? Over 5,000 men are employed directly in the mines and it is probably no exaggeration that with their dependents over 25,000 look to the industry for support. Approximately the same scale of wages is paid for as at the gold mines for the similar types of work.

The prosperous community of Larap in Paracale is an iron mining town. Unlike Baguio, which would have gained distinction as a mountain resort without its mining activity. Larap with a population of 10,000 people has been built up solely as the Philippine Iron Mines Inc., has developed. Six years ago its site was a jungle hillside and a mangrove swamp. To-day it is a well-laid out town, with clean streets and schools for the workers, a modern hospital, recreation hall, and a cine that draws attendance from miles around.

The Hong List for 1941

A THOUSAND and seven printed pages of closely compiled information about Shanghai and its millions of inhabitants is compressed between the carmine covers of the latest edition of The China Hong List, the 1941 edition, which has just been placed on sale by the publishers, The North-China Daily News and Herald.

The new edition of this standard and long-established work of reference discloses that despite wars, depression and international turmoil, Shanghai continues to grow, for the new Hong List contains some seventy pages more than the preceding edition issued a year ago. As has been the practice of the Publishers through recent years, a comprehensive map of Shanghai, brought up to date, is issued with the Hong List at an additional cost of \$2 above the price of the new volume, which is \$25.

The Shanghai Hong List is something more than a mere directory while retaining in full measure all the essentials of a city directory. Within its pages, even for the casual reader, is to be found an immense fund of diverse information dealing with all the multitudinous activities of the Port and those who dwell there. It is the main essential book of reference in any business office. In it are listed all business firms, institutions, missions, diplomatic establishments, consulates, clubs, schools, hospitals and the like with the names of staff members given alphabetically.

A detail of value in the Hong List is the Agency Directory in which is set forth in alphabetical order all agencies held by Shanghai firms. In this section of the book the seeker may find the Shanghai dealer from whom he may obtain any desired standard product manufactured abroad. Related to this section is the Trade Directory wherein is listed all Shanghai firms under professional and trade headings. If a reader has a tooth to be pulled, for example, in this section of the Hong List he can make a choice from all the dentists in the port.

Standard valuable sections of the Hong List are "Shanghai Who's Who," listing residents of the Port with their business addresses, and the "Residential Directory" listing foreign and Chinese residents with their residential addresses. The names of all diplomatic officials and foreign consuls are given in the book along with "Mercantile Marine Officers" serving the many vessels of the Port.

The information contained in the Hong List is by no means confined exclusively to Shanghai for important parts of the book are devoted to the principal cities and ports of China from Harbin to Canton, listing foreign firms, institution and staffs. Also, classified alphabetically by provinces, are listed all foreign missions and their locations with resident missionaries' list. This section is in two sections under headings "Protestants" and "Roman Catholics." In connection with this section of the volume is a "Missionaries Who's Who" in which all missionaries, Protestant and Catholic are listed alphabetically.

The Shanghai Hong List has special value in most homes and is indispensable in offices and business establishments.

New Caterpillar Model

Caterpillar Tractor Co. has announced a four-cylinder, 60-horse-power, automotive engine, called the Model D312.

The engine is a four stroke, valve-in-head, water cooled model with a bore of 4½-in. and a stroke of 5½-in. Maximum horse-power is developed at 1,800 r.p.m., and maximum torque of 193 lbs. ft. at 1,200 r.p.m. Piston displacement is 312 cu. inches.

Pistons in the Model D312 are of aluminum alloy. The block, cylinder head and crankcase unit are in cast alloy iron. There are five main crankshaft bearings, with a total surface of 89.5 sq. inches. Crank pin bearings are 2½-in. in diameter and 1½-in. in length. There is a crankshaft torsional vibration damper.

Water circulation is by pump, with the operating temperature of the water controlled by thermostat. There is an air-cooled type lubricating oil cooler provided. Pressure lubrication is provided to all main and crank pin bearings, camshaft bearings, valve operating mechanism and timing gears.

The engine fuel system is manufactured by Caterpillar Tractor Co., and features solid injection into precombustion chambers. There is an individual pump and valve for each cylinder; and the system is factory set, requiring no adjustment in the field.

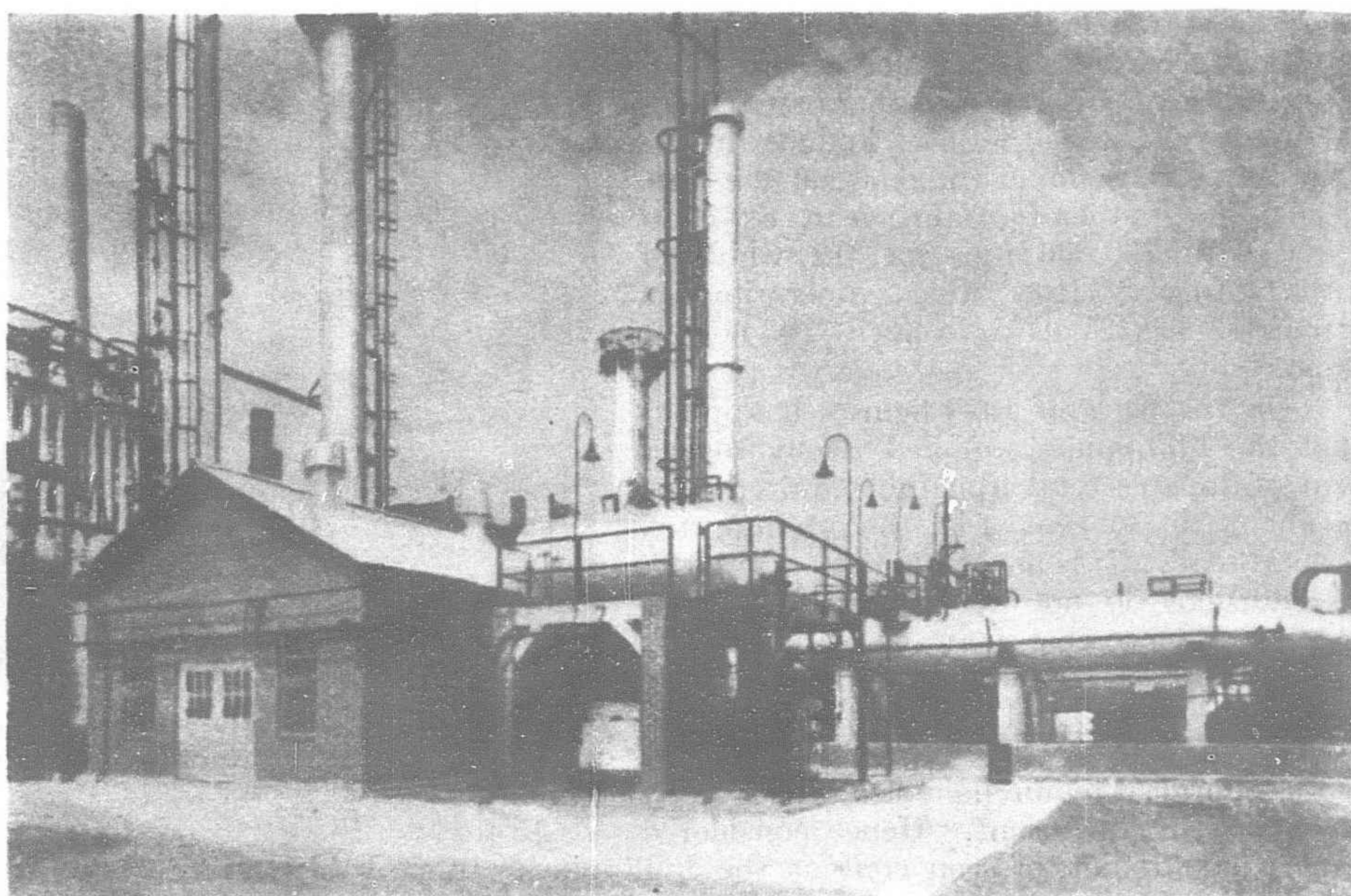
For replacement installations, "Caterpillar's" Model D312 engine is offered as a complete unit, equipped with a five speed Spicer No. 2553 transmission and 13-in. single plate clutch.

Preparation of Charge Stocks for High-Octane Blending Fuels

By HENRY N. LA CROIX, Design Engineer, Foster Wheeler Corporation

WITH the recent rapid changes in prevailing modes of both aviation and automotive transportation, the importance of high-octane number gasoline has increased tremendously and this effect has been keenly felt in refineries throughout the world. A principal result is the trend toward "chemicalization" of the refining industry through great advances in petroleum technology, particularly in America. These take the form of "poly" plants (polymerization to produce high-octane, polymer blending gasoline), "alky" plants (alkylation for production of commercial iso-octane), "isomer" plants (isomerization of normal to iso-butane for alkylation feed), solvent plants (solvent refining of lubricating oils) and extraction plants (removal of hydrogen sulfide, mercaptans, acids). Such processes are highly dependent on chemical affinities and reactions, and successful operation requires mastery of equilibrium distributions, laws of chemical mass action and physical chemistry. They are to be distinguished from the once-standard processes limited for the most part to simple heating, cooling, and condensing, and involving ordinary distillation, cracking (by heating only) and combustion (simple burning).

Although the modern processes were largely developed during the decade of the "Thirties," there is every likelihood that the "Forties" will see an even greater technological advance impelled not only by prevailing economic requirements but also by reckless pressure on the part of certain nations to extend their influence at any cost, with resulting bitter competition. Economic supremacy will demand adequate supplies of high-octane gasoline for aviation



Treating plant for removing H_2S from liquid charge stock to the catalytic polymerization plant at left. The absorber tower is in center of picture; in front are the boiler for regenerating the phosphate solution, heat exchanger bank, and regenerated solution mix tank. At right are surge drums for the H_2S laden charge and treated product.

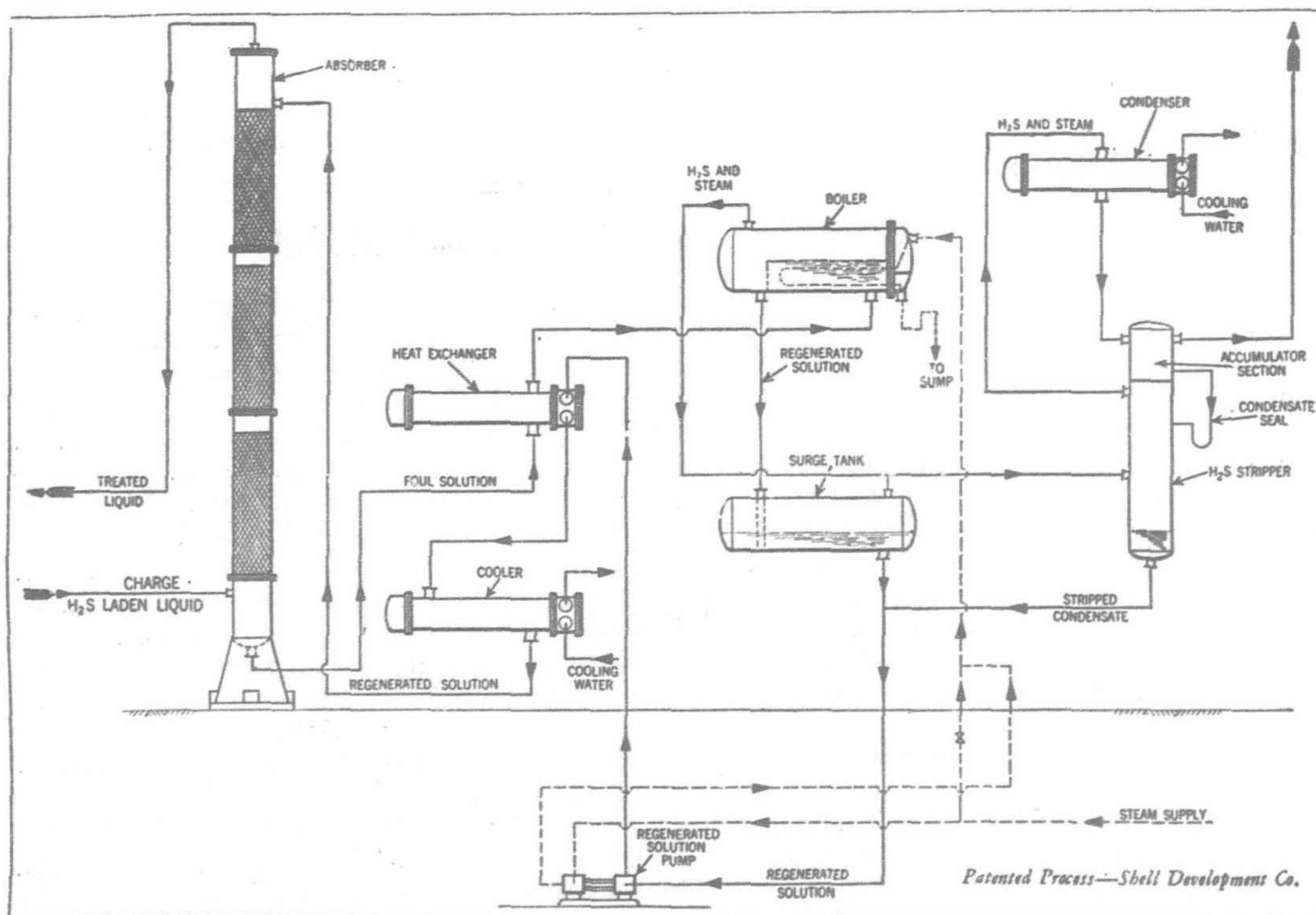
and automotive service to provide the better efficiencies of high compression engines.

The preparation of high-octane gasolines is economically beyond the scope of simple pyrolytic cracking and requires the use of special processes such as polymerization or alkylation to fully utilize the available raw materials. Charge stocks for these units are usually light hydrocarbons, such as methane, ethane, propane, and butane, and the unsaturated or iso-relative of these. These materials, however, are normally contaminated with organic impurities such as nitrogen or sulfur-bearing compounds. The impurities reduce the effectiveness or life of the catalysts employed in the new processes and frequently bring about side reactions, whose products are deleterious to the desired final products. Many of the undesired impurities may be removed much more easily and effectively by treatment of the charge stock than by later treatment since the compounds in the charge are far less intricate.

One of the most obnoxious charge stock impurities is hydrogen sulfide which reduces the net yield or effectiveness of product, poisons the catalyst, and forms undesirable sulfur compounds which are difficult to remove later. Fortunately, the H_2S is easily removed from the charge stock by a number of methods, of which one of the more economical is the phosphate process. One of the latest plants of this type to go into operation is illustrated in the accompanying photographs.

This is a liquid extraction unit preparing liquid hydrocarbons for charging to a Universal Oil Products catalytic polymerization plant. It employs the patented Shell Phosphate Process, using aqueous solutions of tri-potassium phosphate, which is applicable to removal of H_2S from both liquids and gases. In either system the hydrocarbon is contacted counter-currently with the phosphate solution in towers, and the absorbing solution is continuously regenerated and recirculated through the treating process.

The photographs clearly show the absorber tower, the simple regenerative equipment, and the mixing tank for preparing the phosphate solution, as well as the spine-tube heat exchangers

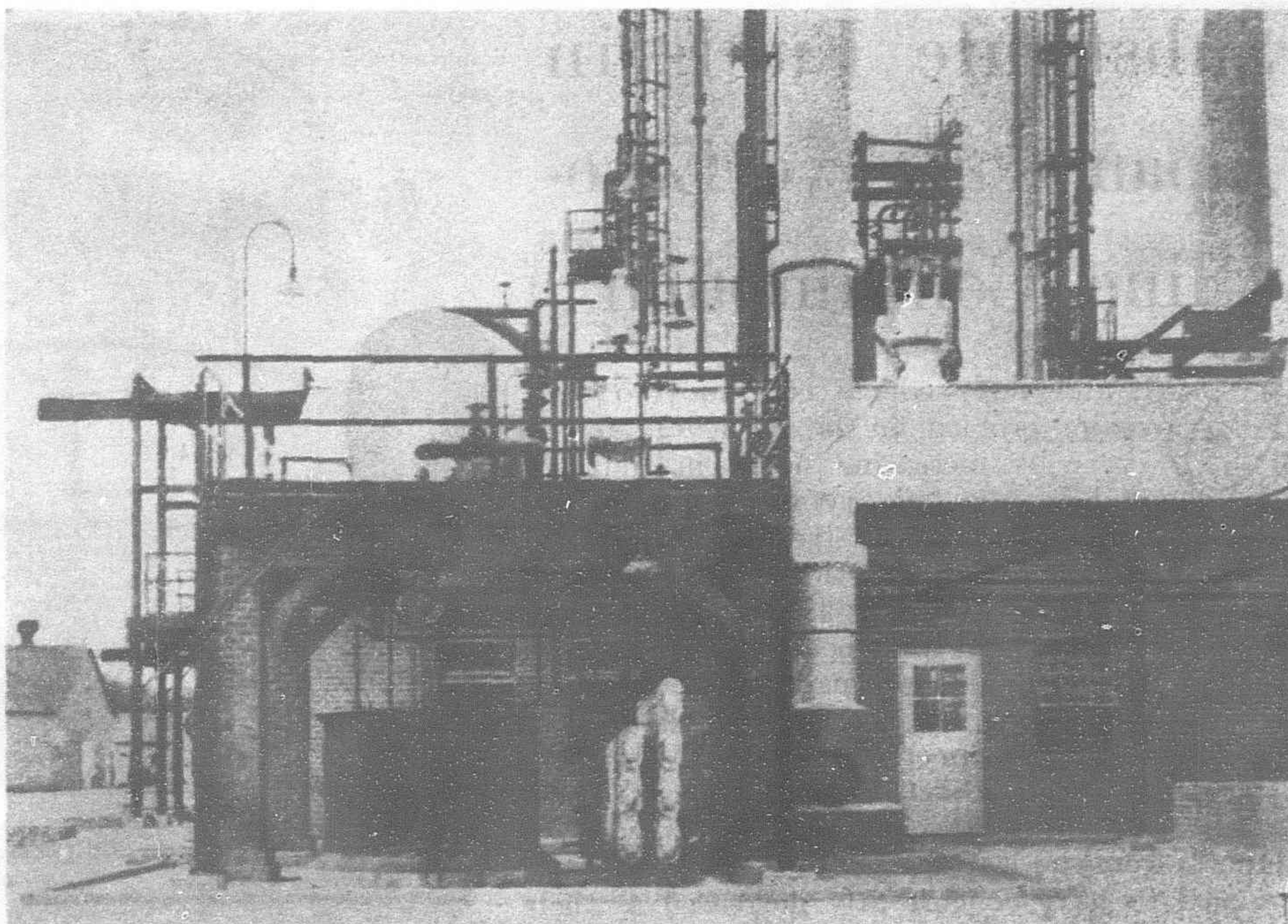


Flow diagram of typical unit for removal of H_2S from liquids based on single counter-current flow of treating solution and hydrocarbon in an absorber filled with raschig rings to give satisfactory mixing and contact surface. The treating solution is regenerated and H_2S vented from the system as a gas.

which provide unusually high heat transfer rates. The phosphate salt may be prepared by chemical neutralization of the acid and alkali used, or it may be purchased in crystalline form, ready to be dissolved in water.

This plant was designed to operate on charge stock containing only 150 grains of H_2S per 100 standard cubic feet of gas, with provision for handling greater quantities if encountered. Due to the small quantity of H_2S to be removed, no condensate stripper was needed. Operation to date has shown a reduction in H_2S content to as low as seven grains. The troublesome hydrogen sulfide is recovered in a gaseous state and is easily disposed of by burning in the boiler furnaces. Operation of the process is simple and costs for both initial installation and operation are relatively low.

A number of H_2S removal plants using the phosphate process are operating on charge stocks for producing various high-octane blending fuels as for example, polymerization units charging both gases and liquids, and alkylation units. The same purification process is also being used on natural gases and by a manufacturer of isopropyl alcohol. The phosphate process is attracting increasing attention of refiners as a simple and economical means of disposal of H_2S and is especially valuable in the preparation of high-octane blending fuels.



Close-up of H_2S removal plant. On the platform in front of pump house are the treating solution regenerator with condenser and separator mounted alongside. Beneath the platform are the solution mix tank and the two banks of spine-tube heat exchangers, affording unusually compact units with high heat transfer ratings. The absorber is at right. Simplicity and over-all compactness of this unit are typical.

The Sungari River

(Continued from page 59)

Six hours more to Chiamussu, the terminal port. Many villages begin to appear on both banks after passing Ilan. Every village within sight is a so-called concentrated village and as its name indicates all houses within a certain area are assembled into a unitary group within the enclosure afforded by a strong mud wall. Block houses are set up at each corner of the quadrangular wall and a lofty tower of steel shoots skyward from the center of the enclosure. Although bandits are now rare, isolated bands in remote regions are sometimes forced to make desperate attacks on farmers in the interior regions, and to prevent just such an event, the Manchoukuo Government a few years ago adopted the system of concentrated villages in sparsely populated regions. Each inhabitant is certified and given an identification card. Outsiders are not permitted to enter freely since a famished outlaw is apt to turn farmer in disguise and later direct his band in an attack. With the increase of concentrated villages, the number of bandits and bandit raids diminished to almost zero, but the appearance of houses clustered within a fortified wall seems strange to the ordinary traveller.

Near noon, or exactly twenty-six hours from Harbin, the boat arrives at Chiamussu, and though the trip may seem uneventful or monotonous, it is certainly worthwhile since this part of the country is somewhat different from other regions. Vegetation is thicker as rainfall is plentiful, and the scenery seems to point out the potentialities and the possibilities of large-scale agricultural development. One gets a good idea of the vastness of Manchuria and the reserve margin which this region, the so-called granary of Manchuria, has in store.

Every year in the summer months a show-boat, stocked to the brim with all the wherewithal for giving entertainment of the brightest for all the dwellers along this great waterway, starts off from Harbin, and continues cruising until the chilly days of late autumn intervene. For the winter months of North Manchuria are no time for any such entertainment. A deathly pall of cold settles over the land, the river is frozen to a depth of several feet and the people, as far as they are able, hole up for the season till warmer days bring them out like hibernating animals from their lairs.

The show-boat has not only actors and actresses and a series of good stock plays, but also films which these bucolic people can enjoy. At every river port they halt for a couple of days or so and each report shows that people come from far and near to listen

to the plays or to see the films. The country folk look on the coming of the show-boat as one of the highlights of their year as there is little enough except hard work to keep them busy for the greater part of it. Packed audiences are the invariable rule at these shows.

The show-boat is large and well fitted. It has ample accommodation for the numbers that usually flock on board to give enthusiastic approval to what is produced. But not all the persons choose to go on board, as many prefer to sit along the bank on their gunny bags and from there vent their approval at the right moment.

This show-boat entertainment is particularly welcome to those who live along the lower reaches of the Sungari for, while many of the outlying parts of the northern districts have been reached by railways and the network of highways which is gradually being extending through Manchoukuo, these areas are so far quite cut off from such methods of communication. Their only contact with the outside world is through this mighty waterway and for many long months of the year no boat can move along it.

The arrival of the show-boat is therefore eagerly awaited as it is their only means of enjoying anything in theatrical entertainment and the inhabitants of Manchuria are great lovers of the theatre and everything connected with it.

It is well worth seeing—this show-boat attraction. How the rustic people revel in the primitive drama that is unfolded to the vast clangor of the native orchestras. How they applaud the age-old strutting and gesticulations, the shrill clamor of the words that are often learned by heart by these rural audiences before the show-boat makes its next appearance.

The warm Sungari evenings make an excellent back-ground for the antics of the players while the moon shines down or the stars are reflected in the eddying ripples of the water as the river flows softly past the vessel which means so much to these northern people.

For days before the ship is due the grape-vine telegraph goes to work and little more than this coming event is discussed. Then when it actually appears persons can be seen coming from all directions by various methods of transportation, determined not to miss the attractions which, to them, come far too infrequently.

Whether any Manchurian Paul Robeson and others will in later years immortalize the show-boat of the Sungari remains to be seen, but the glamor of its coming and entertainment will always prove one of the strongest attractions of the North Manchurian year.

Substitute Fuels in Japan Conserve Gasoline Consumption

OIL and its products continues to be a major problem in Japan, aggravated as it is by increasing needs in industry and by the military services. Despite energetic prospecting and strenuous efforts at synthetic production, domestic crude output is believed to have remained at about the 1936 level, although figures have been suppressed since August, 1937. Because of qualitative changes in the national demand, that is, restrictions in consumption of commercial gasoline, Japanese dependence on the United States' supply of high-octane and other special fuels has increased. Imports from the Dutch East Indies' oil fields are believed to have concurrently decreased as their premier product, commercial gasoline, is precisely the one on which restrictions have been greatest, and were tightened further last year.

The use of substitute fuels, such as wood, charcoal and compressed gasses, has been encouraged; and in some prefectures regulations have been revised to permit vehicles to carry supplies of various gasses in steel containers. Charcoal busses, not always in efficient mobile condition, have become common sights. On April 1 last year, gas was raised from 64 sen a gallon to 83, and the daily quota of taxis in Tokyo was cut by another half gallon to two gallons. Ration cards for private consumers have been sold at big premiums. To compensate for decreased supplies of gasoline, the ratio of alcohol-mixing was raised from ten per cent for one-fourth of the total sales volume, in effect since September, 1938, to the same per cent for one-half the total sales from April, 1939. In July the ratio went up to seven-tenths of sales and, finally, in January, 1940, the ten per cent alcohol admixture was compulsory for all sales. It is planned to increase the ratio to 20 per cent in the near future. Alcohol has been a Government monopoly since 1926. Five plants for the production of industrial alcohol were completed in 1937, six in 1938 and more than ten were either completed or nearly so in 1939. Plans call for a total of 60 plants by 1943, each with an annual capacity of 3,600 kiloliters.

Further production depends on the country's ability to grow enough of the starches (potatoes, sweet potatoes and sugar cane refuse) necessary. This may be difficult in view of the recent decline in food production and shortage of farm labor. In an effort to avoid this agricultural impasse, several plants were projected to obtain alcohol from wood shavings and sawdust. But as these plans were dependent on German technical assistance, the outbreak of hostilities in September halted construction. The European war also caused delay in the completion of several coal liquefaction plants.

Contrary to gasoline, there was enough heavy oil to meet demand in 1939, partly no doubt because of limitation of consumption. Prices were weak at the beginning of the year, but rose later in response to exchange fluctuations and to higher export prices in the United States. Merchants, however, have voluntarily maintained the price at Y2.30 per case. The supply of other petroleum products such as kerosene, light oil and machine oil, on whose use there were no restrictions, increased notably. Kerosene was in particular demand, both for mixture with gasoline and for irrigation pumps in the drought areas in southwestern Japan. Its price naturally tended to rise, but in March a limit of Y7.10 a case was voluntarily established and has since been maintained. Prices



Japan's oil storage capacity is a wartime secret. The tanks like the one pictured have been fabricated from tank sheet steel in the past largely imported from the United States

were similarly fixed for light oil and machine oil from the end of April—Y5.80 a case for the former and Y7.20 for the latter.

Dependence Increases

Consumption of petroleum products has outstripped domestic supplies of crude and thereby increased dependence on outside sources. Figures for recent years are as follows:—

Year	Consumption (1,000 bbl.)	Per cent from domestic crude
1932	13,823	11.7
1933	18,593	7.8
1934	22,948	8.0
1935	25,327	8.9
1936	28,050	8.7
1937*	18,200	6.6

* January-June.

This tendency has probably become more marked since the Sino-Japanese incident began, even with the rigid limitations on non-military consumption. Actual consumption in the last two years and half is not even approximately known due to lack of information about amounts of oil in storage. Calculations are further thrown off by the practice of the Japanese military authorities in China to import supplies directly without touching Japan Proper.

In order to strengthen control further and to smooth out distribution, the Government in 1939 suggested to refiners and importers that they organize a joint sales company to monopolize domestic sales of all petroleum products, including both natural and artificial oils but excluding high-class gasoline and lubricants. By September 2 the business interests concerned had set up the Petroleum Joint Sales Company, capitalized at ¥20,000,000 (half paid up), which was originally scheduled to begin operation on October 1. To legalize the company, the Government late in September promulgated Petroleum Distribution Control Regulations, and in September and October set up the prefectural distribution system by organizing 47 wholesale companies in different prefectures. The latter were to begin operation in November.

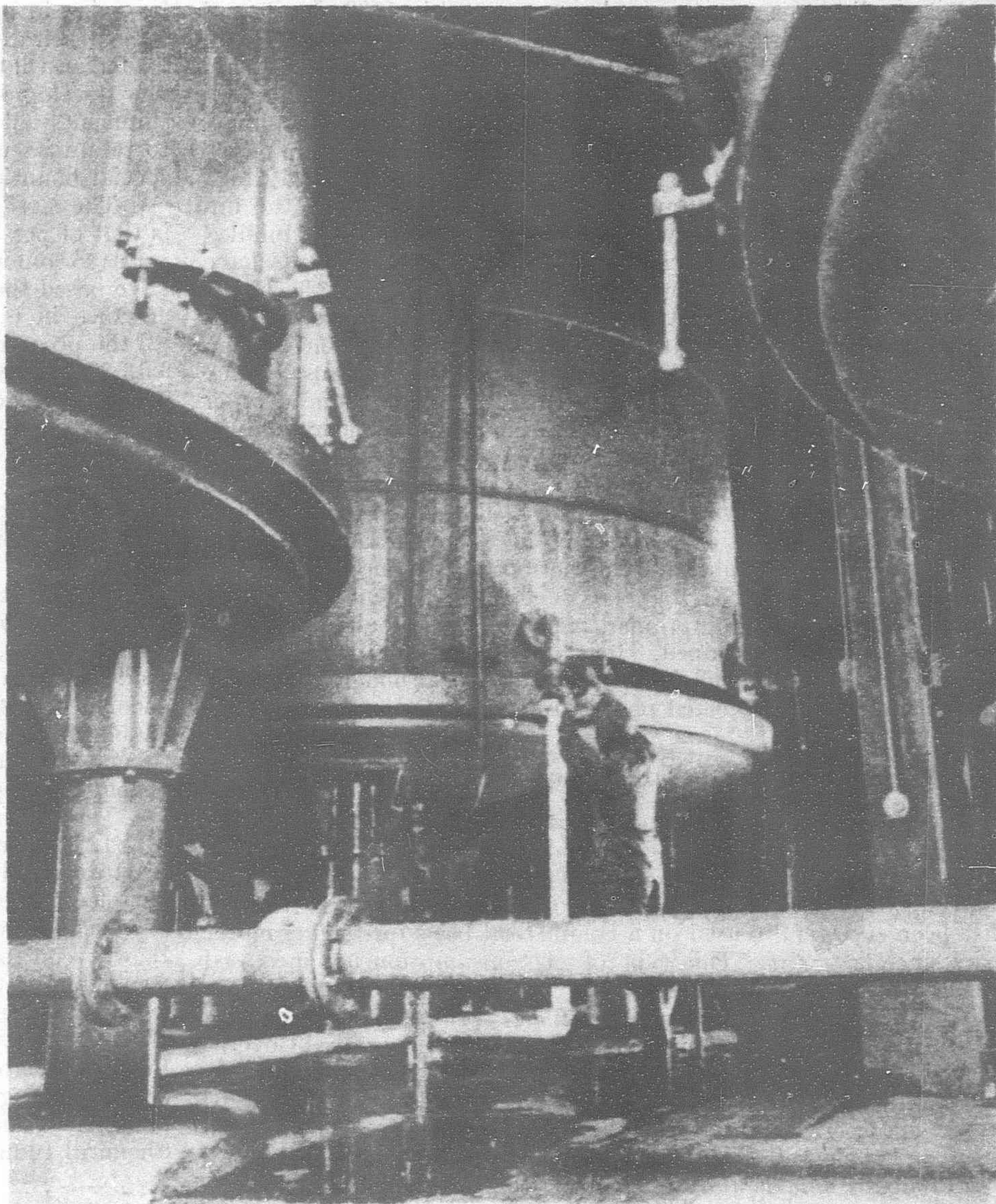
At this point in the proceedings the All-Japan Co-operative Association and the All-Japan Fishery Association, who were opposed to handing over their co-operative storage facilities to prefectural branches and to paying for the resulting higher distribution costs, submitted a plan to revise the proposed system. The Agriculture and the Commerce Ministries acceded to the co-operatives' request and gave them permission to handle a large part of the heavy and light oils and kerosene distributed to industrial co-operatives directly, without working through the prefectural wholesalers. Thereupon the wholesalers strenuously objected, and proposed the dissolution of the new distribution system. Negotiations stood at a deadlock through October and it was only at the end of November that an acceptable compromise was reached, according to which the volume of petroleum products to be distributed by the co-operatives was reduced. The Joint Sales Company was able to begin business in February, 1940, and has as one of its aims the reduction of distribution costs, although this may not be possible in the early future. The company must conduct negotiations with the Government if and when it considers any price changes necessary. The Associated Petroleum Company (Sekiyu Rengo Kaisha), which has hitherto functioned as a liaison organization for the various oil companies, will in the future be limited to exporting as all its other functions have been taken over by the Joint Sales Company.

The Government has been considering merging domestic refineries since the close of 1938, but has had to abandon the plan because of unsolvable difficulties. In substitution, the foregoing Joint Sales Company was set up, and the Toa (Asiatic) Fuel Industrial Company established in July, 1939, with a capital of ¥50,000,000 (one quarter paid up). With funds and technical facilities furnished by the Kokura Oil, Japan Oil, Hayama Oil and other leading oil concerns, this firm will specialize in high-test aviation gasoline when its facilities are completed in the near future.

Refinery Expansion Undertaken

The year 1939 witnessed considerable activity in the expansion, improvement and erection of oil refining plants. A number of important refineries were completed, including the Niigata and the Asahi-Hikoshima plants of the Japan Oil Company and the Kawasaki cracking plant of the Hayama Oil Company. Completion of a few important projects was left until 1940, including the Tsurumi iso-octane refinery, the Shimomatsu acetone-benzol dewaxing plant and the Kashiwazaki pipe-still, all of the Japan Oil Company. The new iso-octane gasoline plant of the Toa Fuel Company will be completed this year.

Artificial petroleum manufacturing enterprises were still in the construction stage in 1939, with the Imperial Fuel Industrial Company, a ¥100,000,000 national policy company (¥40,000,000 paid up) in control. Late this company called in a ¥20,000,000 payment on its capital shares and issued the same amount in fuel



Interior of a synthetic fuel manufacturing plant of the type in which Japan has been making strenuous efforts to relieve her heavy dependence on imported oil

industrial debentures, and with the funds thus raised increased its investments in subsidiary companies. The company also established the Saghalien Artificial Petroleum Company, the Kirin Artificial Industrial Company, the Ube Oil Chemical Industrial Company, the Amagasaki Artificial Petroleum Company and others, and greatly increased its investments in such of its principal subsidiaries as the Hokkaido Artificial Petroleum Company, the Nissan Liquid Fuel, the Japan Oil Chemical Industrial, the Mitsubishi Coal Liquefaction Industrial, Manchurian Synthetic Fuel and the Chosen Coal Industrial. Some of the synthetic petroleum plants owned by these companies have already started operations, but most of them will not get into action until 1941 or 1942. In order to exchange technical information and facilities among member firms, Imperial Fuel Industrial and others in October last year established the Artificial Petroleum Manufacturers' Promotion Association.

Japanese liquid fuel research in recent months has been mainly concerned with seismic prospecting, shale oil refining, oil synthesis and hydrogenation and aviation fuels. Three chemists, Aoki, Tanaka and Kuwara, succeeded in lowering the critical solution temperatures of gasoline and of 94 per cent alcohol blends, and in increasing their stability by adding some higher alcohols, such as cyclohexanol and terpineol. A high speed Diesel fuel was prepared from the gas-oil fraction of Fushun Shale oil by H. Ishibashi, who also observed that the degree of refining of the gas oil had great influence on the combustibility of the Diesel oil by-product. His purpose was to compare the combustibility of Diesel fuels produced by various methods of refining, and among hydrogenation, sulphuric acid washing, solvent refining and hydrogenation followed by solvent refining, he considered the last to be most satisfactory.

According to a seven-year plan announced in 1936, Japan and Manchoukuo together were to produce two million kiloliters of synthetic fuels by 1943. Including power alcohol and other substitutes, production was planned to meet 50 per cent of Japan's requirements by 1943, estimated at 2,470,000 kiloliters, as against the actual use in 1936 of 1,350,000 kiloliters. The duration of the plan was later condensed to five years, in an optimistic mood which production figures do not justify. Even on the basis of the unabridged plan, probably only alcohol production has roughly fulfilled expectations. Existing carbonization and distillation plants have been expanded, but their output is not great. Most of the plants of the Imperial Fuel Industrial Company, as noted above, will not begin producing until next year or 1942. Importation of construction materials was difficult enough in the past, because of lack of foreign exchange, but the European war has introduced other difficulties, including that of getting German equipment into Japan and of transporting the Manchoukuo produce exchanged for it.

A complete coal liquefaction system would be of little use to Japan at present anyway because of the shortage of coal last year which made consumption restrictions necessary, even in factories and in steam electric plants. Furthermore, only one ton of liquid fuel can be produced from four tons of coal, and present liquefaction plants will necessitate an annual increase of eight million tons of coal over what is now mined. It is apparent that Japan is still far from even partial self-sufficiency in liquid fuels, although the picture may change when projected plants are brought into operation.

Natural Gasses Used

As an example of how Japan is now using her natural resources to the limit, the use of waste natural gas as a motor fuel may be mentioned. After gasoline, carbon black and iso-octane are removed, the remaining gas from the well at Otaki, Chiba Prefecture, has been successfully used on a commercial basis for fueling motor cars since last year. This type of gas consumption has increased remarkably in recent months.

Although no figures may be given here, prospecting and drilling continued to be active, as may be judged from the increased Government subsidy, which (exclusive of amounts for North Saghalien) increased to ¥7.8 million for 1939 as compared with ¥3 million for 1938. Prospecting enterprises licensed by the Government also increased their wells from 47 in 1938 to 105 last year. The Japan Oil Company's fields at Katsurazaka and Otaki were brought into production, and wells at Nishiyama, Yabase and Innai made encouraging showings.

Of crude sources outside Japan Proper, Saghalien apparently continues to furnish its customary annual production of some 250,000 tons, although no statistics have been published for several years. Decreased shipments from Saghalien since 1936 are not due to a drop in output of Japanese fields, but to the refusal of the Soviets to sell their crude to Japan after the Soviet refinery was completed in Habarovsk in that year. It is reported that the Compania Veracruziana, financed by an affiliate of the Nippon Soda in Tokyo, the Chunambe Crude Oil Importing Company, has begun drilling on its 10,000 acre concession on the isthmus of Tehuantepec, obtained 1937. A prospective deal to barter soy beans for Mexican crude is said to have fallen through.

Of straight imports, which it is reasonable to assume have risen along with the progress of the Sino-Japanese incident, the East Indies were able to supply a considerable amount as long as Japanese needs remained but a small part of their production. But while their shipments have remained approximately the same in volume, their percentage share in Japan's oil imports has dropped from 27.2 per cent to 16.7 per cent. Despite Japan's efforts to find other sources and thereby soften the possible blow of an American embargo, the United States' share in Japanese imports has actually increased and is still increasing. The most important reason for this, of course, is that the United States is the only country which can supply in quantity those petroleum products such as 100-octane aviation gasoline which are so necessary in military operations. Imports from the Netherlands East Indies have similarly been curtailed, because it is upon their major item, ordinary motor fuel, that Japan has placed greatest restrictions of consumption.

Financial operations and returns of leading domestic oil companies were maintained at normal levels last year. What business they lost in sales to the public because of restrictions was balanced

by gains in special high-grade items. Leading companies maintained their dividend rates unchanged as a rule, although the North Saghalien Oil Company was a notable exception. It undertook no new development work and at the same time both production and shipments fell off sharply. Under the circumstances, it managed to retain its usual four per cent dividend rate only by means of special bounties and a ¥3,177,000 subsidy from the Government.

The most pressing immediate problem facing domestic oil men is that of persuading the Government to allow them to raise retail prices to conform with higher costs of landing crude in Japan. They have based their argument on the following points: (1) The sharp advance in tanker rates from the United States since last fall; (2) the prospect of a rise in domestic tanker rates from the present ¥13.75 to ¥18, ¥19, or more; (3) depreciation of the yen in terms of American dollars; (4) increased prices on export oil in the United States, and (5) their own advance in production costs due to reduction in domestic consumption. The Government has answered Point 2 by saying that such an increase is merely prospective and has not yet occurred and Point 4 by arguing that some American crude producers have cut prices, not raised them.

However, the Government has admitted that raises for gasoline, kerosene, heavy and light oil and machine oil might soon be permitted, and, on April 1, did allow gasoline to go up from 64 to 83 sen per gallon, and some other increases. As the cost of imported crude is actually rising, domestic refiners find it difficult to make ends meet without price increases, which will at the same time enable those refiners whose crude sources are within Japan Proper to make greatly increased profits. Such a situation will chiefly benefit the Japan Oil Company.

The prospecting subsidy for the 1940-41 fiscal year will jump to ¥12 million, from the ¥7.8 million for the present fiscal year. A national policy concern with the provisional title of the Imperial Petroleum Resources Development Company is expected to be established shortly, financed jointly by Japan Oil and other firms. It will control developing activities, particularly of small fields owned by individuals or small capitalists. It is hoped that artificial oils will be on the market this year from the Miike plant of the Mitsui Mining Company, the Fushun plant of the South Manchuria Railway Company, the Wanishi works of the Japan Iron and Steel Manufacturing Company, the Tokyo Gas Chemical Industrial Company, the Foho Chemical Industrial Company and the Manchurian Chemical Industrial Company.

The Chemical Industry in Manchuria and the S.M.R. Central Laboratory

(Continued from page 65)

The above is an outline of the major subjects of the research and laboratory work undertaken by the S.M.R. Central Laboratory. There are a number of other subjects on which the Central Laboratory has been commissioned to carry out research, but space forbids our dwelling on them at length.

For example, the Central Laboratory has set up an organic chemistry laboratory and an inorganic chemical analysis laboratory, which devoted their time to the chemical analysis of ores, metals, oils, fats, processed articles, mineral oils, textiles, etc., at the request of the South Manchuria Railway Company or the general public. Expert opinion is given by these laboratories. This line of business is making no small contribution to the development of the S.M.R. Company and also to the exploitation of raw materials in Manchuria and North China and to the industrial development of Manchuria. These laboratories, too, are carrying out research, with the object of improving and standardizing present methods of analysis. It may also be mentioned that they are at work now on a new process of manufacturing substitutes for cylinder oil and grease.

In the field of brewing, too, the Central Laboratory has evolved various new processes, facilitating the growth of the brewing industry in Manchuria. The Laboratory is culturing over 700 kinds of fermentation bacilli, which have been fully investigated and classified. It may well be proud of its collection of these bacteria, unparalleled in number and variety in this part of the world. This remarkable collection of fermentation bacteria forms a splendid basis for research on fermentation, but provides the brewing industry with a sure reference guide.